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## Anderson's Stone Dresser.

To substitute, for the slow and laborious operation of dressing stone by hand labor, a method of doing the same work by machinery, has been a problem, the solution of which has been earnestly sought, we are sorry to say, for the most part, unsuccessfully. It is true that, for cutting some of the soft varieties of stone, machines have been devised which do their work very satisfactorily, but we think we are warranted in the assertion that for working all kinds of hard stones used in building and mill work, no machine, meeting all the requirements of the case, has, up to the present time, been produced.

However, if we may credit the statements made in regard to the machine which forms the subject of the present article, it has proved itself equal to dressing the hard varieties of stone, with great facility, and in a very perfect manner.

The machine was publicly tested on July 11th, of the present year, at Quincy, Ill., with, it is said, entire success, eliciting the warm encomiums of many engineering experts, who were present on the occasion.

Of this test the *Daily Whig* (Quincy, Ill.), speaks as follows:

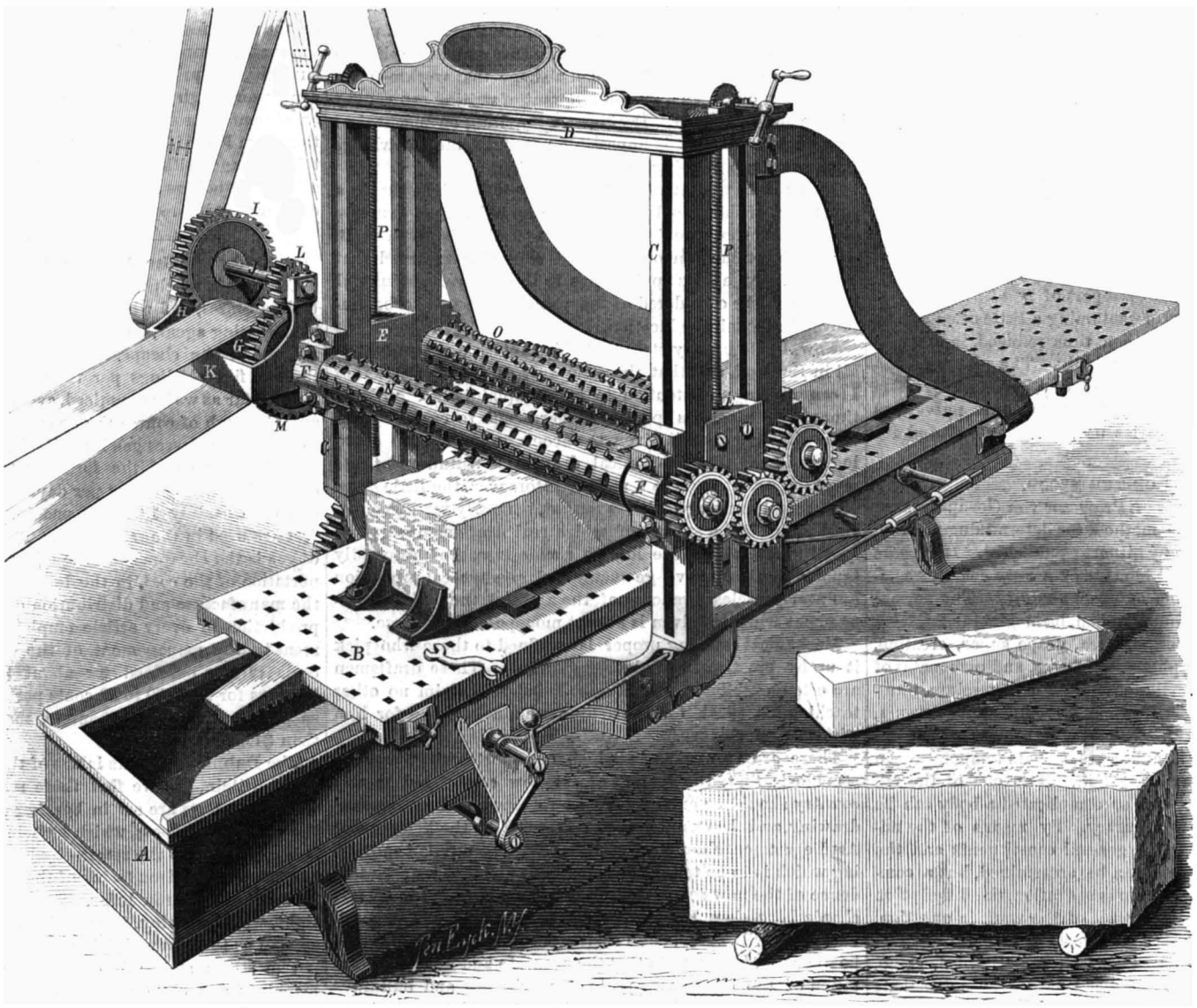
"The machine is, in construction, very similar to that of an iron planer, except that the tools are fixed in revolving cylinders, under which the stone passes, the width of stone cut at one passage being limited only by the length of the cylinder, which, in a large machine, may be at least six feet long, thus cutting a perfectly uniform level and handsomely marked surface (of either smooth or rustic finish, if desired) of six feet in width, and at the rate of three inches per minute, while taking off a depth of three inches or more of "rough." This will be doing the work of from thirty to fifty stone cutters. The unanimous opinion expressed by all who witnessed the operation of the machine in cutting different blocks of stone of various qualities, including several which had been selected on account of extra hardness—one having been brought from the Lock work at Keokuk, by Major Burnham, for that reason—was of unqualified approval, both in regard to the surface left on the stone, the amount of work accomplished, and the perfect condition retained by the machinery and tools after doing a large amount of cutting.

"It is generally conceded that this trial and its favorable results constitute an event of importance in the business history of our city, as well as of general interest, in consideration of the great change which must be brought about in the stone business as regards price, quality, styles, etc."

The *Herald*, of the same place, speaking of the quality of the stone dressed, says:

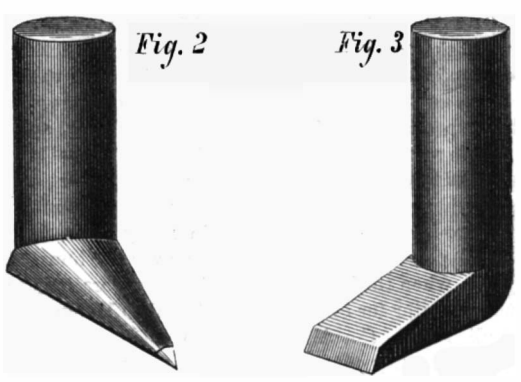
"The first test was made upon a Joliet stone about two feet wide, four feet long, and a foot thick. The machine operated like a charm, and although the stone was one of the hardest that could be obtained, the points walked right through the rough edge, and the chisels left a surface perfectly smooth and beautiful in appearance. Next a stone, brought from Keokuk, one of the same kind used by the Government in the canal works around the rapids, was tried. This stone, though not so hard as the one from Joliet, is said to be much more durable and more difficult to dress, on account of the quartz seams which it contains. About two and a half inches were taken off the edge, and the dressing was, in every respect, equal to that obtained in the first instance. Several other tests were made upon the same stone with similar results."

Photographs of the surfaces of stones dressed by this machine have been sent us, from which we are enabled to say that the character of the work performed is all that could be desired; and should no obstacles to its future progress arise, the advent of this machine will exert an extraordinary effect upon all the trades connected in any way with stone cutting.




ANDERSON'S STONE DRESSING MACHINE.

A is the frame of the machine, upon which are formed the ways upon which the bed, B, is moved back and forth to feed the stone to the cutters, and in which a number of holes are placed to enable the operator to secure the stone to the bed and in place. To the frame, A, is secured the two side frames, C, the upper ends of the four uprights of each of which are connected to each other, and secured in their proper relative positions by the top frame, D. Blocks, E, are placed in the space between the four uprights of the two side frames, C, and move up and down upon the uprights. F represents




the boxes in which the journals of the cutter shafts or cylinders revolve, and which are secured to the opposite sides of blocks, E, by bolts, so that by tightening up the nuts of the bolts, the block, E, and boxes, F, when adjusted to the proper position, may be securely clamped to the frame, C. G is a pulley, around which passes the driving belt, and with which is securely and rigidly connected a small gear wheel, H. The pulley, G, and gear wheel, H, work loosely upon the projecting journal of one of the cutter shafts. The teeth of the small gear wheel, H, mesh into the teeth of the large gear wheel, I, attached to the short shaft, J, which revolves in bearings in the frame, K, attached to the block, E, and to which is also rigidly attached the small gear wheel, L, the teeth of which mesh into the teeth of the large gear wheel, M, rigidly attached to the journal of one of the cutter shafts.

By this arrangement of gearing, the rapidity of motion will be lessened, and the power increased in the same proportion, causing the cutter shafts to revolve at a slow rate of speed, and with great power. N is the forward, and O is the rear cutter shaft, to which are respectively attached the cutters, Figs. 2 and 3. The cutter, Fig. 2, which first operates upon the stone, is made pointed, and similar to the tool used by the workman for roughing by hand. Fig. 3 represents the form of the rear cutters, the edges of which are broad and flat, and which are so arranged that the path cut by each following cutter will overlap that of the preceding one. The shanks of the cutters enter the shafts, N O, and are secured in place by set screws. The cutters are made of steel or chilled iron, or may have diamond carbon faces, and are arranged in spiral rows upon the shafts, N O, so that in cuts not more than four inches deep, not more than four cutters on each cutter shaft will be cutting at the same time. P are long screws passing through and swiveled to the top plate or frame, D, and which pass through the center of the block, E, through screw holes formed in or through nuts secured to said block, E, so that by turning the said screws in one or the other direction, the blocks, E, and with them the cutter shafts, N O, may be raised and lowered to adjust them at any desired distance above the bed plate, B. To the upper end of the screws is rigidly attached a small gear wheel, in the teeth of which will mesh a screw pinion for the purpose of rotating the screws in either direction, for raising or lowering the cutter shafts.

It is claimed that for dressing limestone, sandstone, and marble, the steel cutters, shown in Figs. 2 and 3, will do their work perfectly, but that for granite or French burr, the carbon or "black diamond" points will be requisite.

Fig. 2 shows the form of steel cutters used on the forward, and Fig. 3 the form used on the rear, shafts for smoothing.

These cutters strike no violent blows, to fracture the stone or make breaks or holes in its surface. Their motion is so slow as not to heat the tools, but so forcible as to enter the hardest limestone, or marble. When cutting granite, by the use of tools armed with carbon points, the speed is increased one hundred times, cutting down a "rough" of three inches, and throwing it off in the form of impalpable powder.

The machine has been styled the Mastodon Stone Dresser, It was patented through the Scientific American Patent Agency, July 12, 1870, by Mr. A. G. Anderson, of Quincy, Ill., and the patent is now owned by Rice & Anderson, of that city, from whom further information may be obtained. P. O. Box 601.

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It is no uncommon sight in our streets to see laborers rubbing down the fronts and steps of freestone buildings with sand and water to take off stains and give them a fresh and new appearance. In London they have recently for this purpose adopted the use of steam fire engines. The jet of water is projected with such force, it is said, as to remove the discoloration as effectually from the stone as by hand and sand and a fraction of the cost. On Portland stone it is said to be specially adapted, and if so, we do not see why it cannot be used on marble fronts as well as stone.

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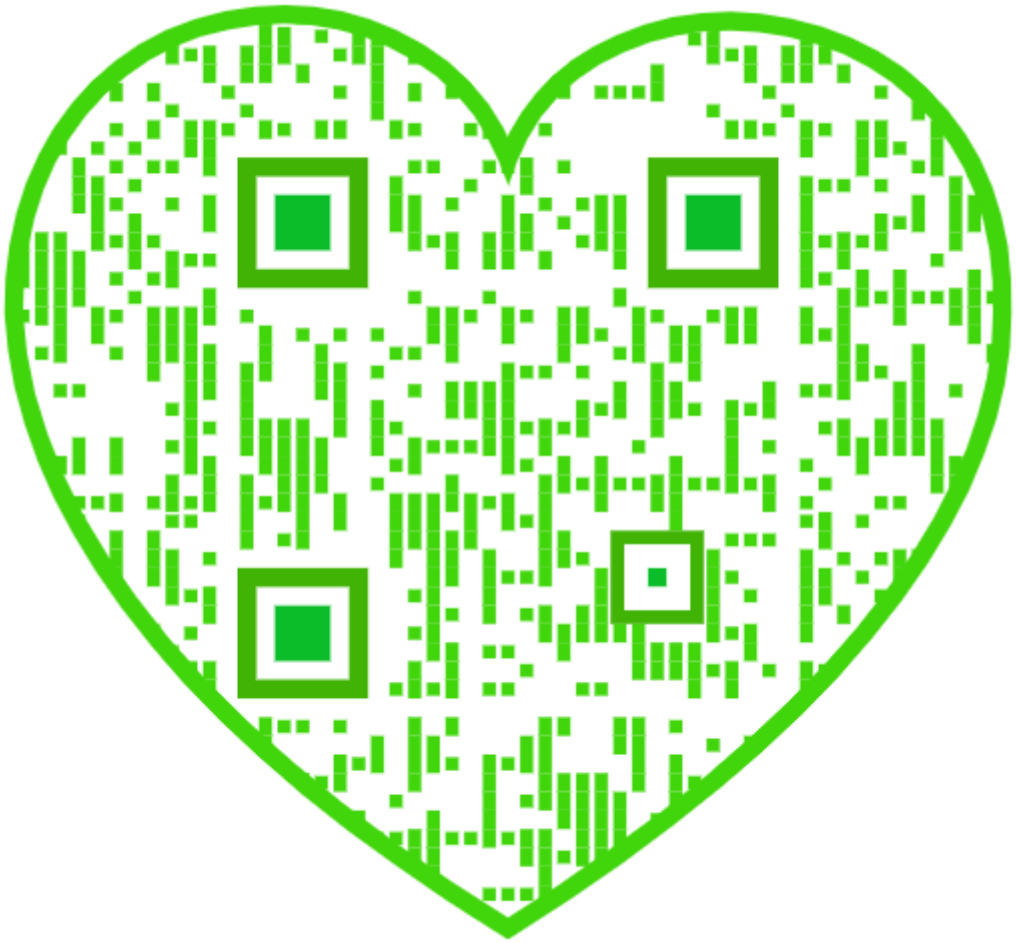

## SCIENTIFIC INTELLIGENCE.

### USE OF ELECTROTHERMOTICS IN ANALYSIS.

Professor Mulder proposes a new system of analysis, which admits of rapid manipulation, and can be performed as a lecture room experiment. A platinum wire is melted into the top of a graduated glass eudiometer, and connected with one pole of a Grove battery (three cells are sufficient for most purposes), and the connection with the other pole is accomplished by a wire passing through the mercury of the pneumatic trough. If a given volume of hydrochloric acid be introduced into the eudiometer in the usual way, and fine iron wire, attached to the connecting wire, be brought in contact with the platinum pole within the graduated tube, the iron will immediately begin to glow, chloride of iron will be produced, and as soon as the operation ceases, the lower wire can be withdrawn, and the remaining volume of hydrogen read off. In this way, hydrochloric acid can be analyzed in a few moments. The same principle will apply to the analysis of other compounds; for example, sulphuretted hydrogen with copper, vapor of water with iron, and mixtures of gases and (by synthesis), iron, carbon, and sulphur. Combustion can be accomplished in the same way, and the phenomena of the oxidation of alcohol, etc., be shown. Dissociation experiments can be exhibited by means of platinum, palladium, iridium, and rhodium with ammonia, vapor of water, etc. Electrothermal analysis is highly recommended by Professor Mulder, on account of the rapidity and simplicity of the manipulation, and the cheapness of the apparatus; and he promises soon to give a complete description of all of the experiments that can be performed in this way.

### IRON CEMENT.

Winkler has found that the best iron cement can be made by preparing a mixture composed of 16 parts of clean wrought iron filings, 3 parts of pulverized sal ammoniac, and 2 parts of flowers of sulphur This mixture can be kept in a dry package any length of time, unchanged; and when required for use, it is better to reduce one part of it with 12 parts of iron filings, and enough water containing a little of sulphuric acid, to form a stiff paste. When thus reduced, it must be immediately applied, as it sets rapidly. The author recommends it for joining broken pieces of cast iron, and for stopping large fractures. For very fine work, pure pulverized iron filings, such as apothecaries use, can be substituted for the coarse article.

### ANALYSIS OF THE BLOOD.

The zoöchemical analysis of Professor von Gorup-Besanez contains the most accurate method, for determining the constitution of the blood, of any hitherto published. It appears from this learned work that blood is of a very complex composition, but is still capable of exact analysis. The normal blood contains water, fibrine, albumen, hæmoglobine, fat, fatty alkalies, lecithin, cholesterine, urea, grape sugar, creatine, creatinine, uric acid, phosphates, sulphates, and carbonates of the alkalies, chloride of sodium, chloride of potassium, phosphate of lime and magnesia, iron, and traces of silica, oxygen, nitrogen, and carbonic acid. The specific gravity of human blood varies between 1·045 and 1·075, and its temperature in the veins, between 93° and 104° Fah. It is one of the triumphs of modern science that so complicated a body can be determined with so great accuracy. By means of the microscope and spectroscope, the general constituents and the probable origin of the blood can be ascertained, but a complete analysis is a long and tedious operation, the description of which occupies forty-two pages of the work in question. Professor von Gorup gives the best methods for deciding upon the origin and age of blood stains on metal, wood, stone, cloth, etc., and shows that, in judicial cases, these questions can be ascertained with absolute certainty,

### SOLUBILITY OF OXYGEN IN WATER.

By a transposition of words, we are made to say on page 152, current volume, that nitrogen is more soluble in water than oxygen; this is a mistake, as is apparent in the subsequent part of the article, where the table shows that Mallet makes use of the greater solubility of oxygen in water to obtain that gas from the atmosphere. Water takes up about one twenty-fifth of its bulk of oxygen, at 32° Fahr., and one thirty-third at 60° Fahr. According to Bunsen, 100 cubic inches of water dissolve 4·11 cubic inches of oxygen at 32° Fahr., and 2·99 cubic inches at 59° Fahr.; and the same author states that 100 cubic inches of water at 32° absorb 2·03 cubic inches of nitrogen, and 1·48 cubic inches at 59° Fahr. These numbers are materially affected by pressure, as shown by the results obtained by Mallet.

## Workmen and Mechanical Drawing.

Professor Fleeming Jenkin, in his introductory address on Mechanical Science (British Association), spoke at some length on the subject of drawing: I have in many places said (he observed), and I cannot say too often, that the great want of the workman is a knowledge of mechanical drawing. Unfortunately I can obtain little attention from the general public to this demand for the workman. Very few persons, not being engineers, know at all what mechanical drawing is. I am sorry to say that some examiners in high places, who direct the education of the country, know very little more than the general public, and teachers, who should give bread, give chaff. I unhesitatingly say that the chief inferiority of Englishmen has been in this one branch of knowledge. Mechanical drawing is the art of representing any object so accurately that a skilled workman, upon inspecting the drawing, shall be able to make the object, without any further verbal or written instruction from the designer. The objects represented may be machines, implements, buildings, utensils, or ornaments. They may be constructed of every material. The drawings may be linear, shaded and colored, or plain. They must necessarily be drawn to scale, but various geometrical methods may be employed. The name of mechanical drawing is given to one and all those representations, the object of which is to enable the thing drawn to be made by a workman.

Artistic drawing aims at representing agreeably something already in existence, or which might exist, and for the sake of the representation; mechanical drawing aims at representing the object, not for the sake of the representation, but in order to facilitate the production of the thing represented. Now, I say that it is this latter kind of drawing which is so vastly important to our artisans, and hence to our whole wealth producing population.

Very few workmen or men of any class can hope to acquire such excellence in artistic drawing that their productions will give pleasure to themselves and others; but a great number of workmen must acquire some knowledge of the drawings of those things which they produce, and there is not one skilled workman or workwoman who would not be better qualified, by a knowledge of mechanical drawing, to do his work with ease to himself and benefit to the public.

Mechanical drawing is a rudimentary acquirement of the nature of reading, writing, and arithmetic. In order that a man may understand the illustrated description of a machine, he must understand this kind of drawing. To the general public an engineering drawing is as unintelligible as a printed book to a man who cannot read. The general public can no more put their ideas into such a shape that workmen can carry them out, than a person ignorant of writing can convey his meaning on paper. Reading and writing on mechanical or industrial subjects is impossible without some knowledge of the art I am pressing on your attention.

This art is taught abroad in every industrial school; a great part of the school time is given up to it. In a Prussian industrial school, one third of the whole time is given to it. A French commission on technical education reported that drawing, with all its applications to the different industrial arts, should be considered as the principal means to be employed in technical education.

Now, I deliberately state that this subject is not taught at all in England, and that the ignorance of it is so great that I can obtain no attention to my complaints. A hundred times more money is spent by Government to encourage artistic drawing than is given to encourage mechanical drawing; and I say that mechanical drawing is a hundred times more important to us as a nation. Moreover, the little *quasi* mechanical drawing which is taught, is mostly mere geometrical projection, a subject of which real draftsmen very frequently, and with little loss to themselves, are profoundly ignorant. Descriptive geometry and geometrical projection are nearly useless branches of the art, and the little encouragement which is given is almost monopolised by these.

Mechanical drawing proper is confined to those who pick it up by practice in engineering offices. These draftsmen are often excellent; and for their behoof I claim no other teaching. I speak for the artisan who makes, and for him who uses, machinery.

There are two ways in which our shortcomings may be remedied; first, the schools of art now established in this country should be enlarged, so as to teach real mechanical drawing, and the examinations conducted by the Science and Art Department should be greatly modified; secondly, the drawing which is to be taught in the schools under the superintendence of the new school boards may be, and ought to be, mechanical drawing. Free hand drawing, as a branch of primary education, will, I fear, be an useless pastime: but whether that be so or not, I am certain that the accurate and neat representation of the elementary parts of machinery and buildings would be popular with the pupils, and could be effectively taught.

This kind of drawing educates hand and mind in accuracy; it teaches students the elements of mensuration and geometry; and it affords considerable scope for taste where taste exists. The chief difficulty will be to obtain competent teachers. I shonld occupy you too long were I to attempt to show how these must themselves be trained. My chief aim to day has been to claim attention for a most important and wholly neglected branch of education.

## One Pound of Coal per Horse Power.

It is said that a firm in London is now constructing the most economical steam engines in the world. For their mill engines, these manufacturers guarantee a consumption of less than 2 pounds of coal per horse power per hour; and they claim that in some cases these engines in practice have brought the figure as low as 1 pound of coal per horse power per hour. To realize the importance of this improvement, we must consider that ordinary steam engines, in many cases, burn as much as 10 pounds of coal per horse power per hour. This is common, when the boiler admits of the evaporation of only 6 pounds of water for every pound of coal. When engines are supplied with Cornish boilers, so celebrated for their economy (since they evaporate 12 pounds of water for every pound of coal), the ordinary consumption is 5 pounds of coal per horse power per hour; and the reduction of this amount to 3 or even 2½ pounds has thus far been considered something extraordinary—the best result, in fact, to be practically obtained. That there is, however, still room for improvement, is evident from the theory of the mechanical equivalent of heat. One pound of good anthracite coal will produce, in combustion, 14,220 units of heat; while 1 pound of bituminous coal will produce 13,500 units. Let us adopt the round number, 14,000 units; that is to say, the proper combustion of 1 pound of coal should heat 14,000 pounds of water 1 degree, or 140 pounds 100 degrees, or 14 pounds 1,000 degrees Fahr. But heating water 1,000 degrees changes it into steam; and experiments have proved that it takes exactly as much heat to change 14 pounds of water into steam as to heat 140 pounds of water 100 degrees. Therefore the 14,000 units of heat developed by the combustion of 1 pound of coal will change 14 pounds of water into steam; and it is by the intervention of this steam that we have to obtain the mechanical equivalent of the 14,000 units of heat. The well established mechanical equivalent of each unit is 772 foot pounds. In fact, for every foot that we cause 772 pounds to descend, we may actually obtain a unit of heat; and therefore we are entitled to expect inversely the development of a force of 772 foot pounds for every unit of heat expended. The 14,000 units of heat, obtained by the combustion of 1 pound of coal, should give us, then, 14,000×772, or 10,808,000 foot pounds If the coal is burned in 1 hour, we ought to obtain this force per hour; and, as 1 horse power is equal to a force of 33,000 foot pounds per minute, or 33,000×60 = 1,980,000 foot pounds per hour, we ought to have 10,808,000 ÷ 1,980,000, or 5·4 horse power per pound of coal consumed per hour. The best engines, therefore, in place of obtaining, as heretofore, only one tenth or one twentieth of the theoretical equivalent of the heat consumed, are reported to have reached nearly one fifth, which is certainly a wonderful advance. Of course, the full theoretical equivalent can never be expected, for reasons which we will not now discuss. Most engineers are agreed on the main features of the most economical steam engines. They are: Proportionally large boilers, with large heating surfaces, and proper grates; heating of the feed water in the condenser; high pressure in connection with proper cut off arrangements, so as to utilize the expansion; careful protection from loss of heat by radiation; and, above all things, intelligent and faithful engineers and firemen. Many moderately good boilers and engines lose all claim to reasonable economy by improper treatment in firing.—*Technologist.*

## The Dublin Gas Works.

Coal gas is much more used in Great Britain than in the United States, and whereas in our country it is an expensive illuminating agent, on the contrary it is, in the former country, one of the cheapest sources of light, selling for from three to five shillings per thousand feet. Throughout Ireland, so far as we have noticed, every village has its gas works, and although of course the poor people burn tallow dips, yet to the better classes gas is available. Comparing Dublin with New York, we find the former city, of 250,000 inhabitants, consuming 4,000,000 feet per day, whereas in our own metropolis of certainly 1,000,000 people, not more than 8,000,000 feet are used in the same time. The cause of this low price of gas is the cheapness of the labor in the mining and transportation of the coal, in the building of the gas works and the manufacture and distribution of the gas; in fact, in the production of every article employed and in every department in the management of the establishment. Good gas coals can be obtained for about $3.50 per tun; ordinary laborers for from 50 to 60 cents per day, and skilled laborers, such as machinists, carpenters, masons, etc., for not more than $1.50 per day.

The Dublin gas works is one of the best managed works in Great Britain, and we find there several points of interest. The clay retorts are set in benches of nine, and closed with the self sealing doors, which have machine turned edges, and, being attached to the retorts by hinges, are brought in close contact with the iron facing of the retorts, also perfectly true, by means of an iron lever. The doors are thus closed gas tight, without luting, thus saving the expense of the latter as well as the cost and delay in handling doors, as with us.

The steam stoker is employed, and with two of these machines and eight men, 540 retorts are charged and discharged, the retorts being worked in six hour charges, the men working twelve hour relays. The machine empties three retorts at a time, by means of as many long rakes, which are thrust into the retorts and rake out the coke, which falls through an opening in the floor into the iron wagon. Three scoops, filled from a hopper with coal, are then moved into the retorts, overturned and withdrawn. There are three men upon the machine, one controlling the steam, one the valves that fill the scoops, and one the movements of the rakes and scoops. A fourth man stands upon the floor to sweep up whatever may fall thereon during the operation. This is certainly the most expeditious working of retorts we have ever seen.

McKenzie's patent mixture of coal and coal oil was formerly employed at the Dublin works. It is now, however, abandoned. In place of this, the coal is coarsely pulverized in a Chilean mill and mixed with the coal tar, produced upon the premises. This mixture is quite dry and is found to work well. After a time the coal tar from this process fails to yield any gas, when it is sold to a patent fuel company in Wales. A portion of it is also consumed upon the spot in making a patent fuel with the coke breeze, which is thus cemented into cylinders of four inches diameter and one foot length.

Some year or two since, the city compelled the works to adopt the iron process, and for purifiers the engineer adapted two disused gasholders. At the bottom, one and one half feet in depth of lime is placed and, then, supported upon as many trays, six layers of a mixture of bog iron ore and sawdust, each layer one and one half feet thick, and finally another layer of lime. The purifier works well, delivering gas containing 20 to 25 grains of sulphur and one per cent carbonic acid, and with a moderate pressure. This use of the layer of lime confirms a previously formed opinion of the writer as to the benefit of its employment in the iron process of purification.

To re-enumerate therefore the noticeable peculiarities of these works, we mention: The self sealing retort doors; the

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steam stoker; the use of the mixture of coal and coal tar' consuming the coal tar upon the premises; the two enormous purifiers, formerly two gasometers, and a depth of nearly ten feet of purifying material therein.—*American Chemist.*

### Soluble and Insoluble Phosphates of Wheat.

BY F. GRACE CALVERT.

The results of my investigations have met, fully, my expectations, viz., that the phosphates in each of the cortical envelopes of the grain vary not so much in kind as in quantity; their proportion varies gradually from the exterior envelopes to the interior ones; so that, while flour contains only a trace of the phosphates, specially soluble, the bran contains a large quantity of it.

Total proportion of phosphoric acid in 100 parts of bran, 1·682; in 100 parts of flour, 0·921.

Total proportion of phosphoric acid in soluble phosphates: in 100 parts of bran, 1·211; in 100 parts of flour, 0·080.

A miller having agreed to grind and bolt several sacks of wheat, in order to enable me to obtain in a separate state the different materials which constitute the grain, sent me five different samples as representing, roughly, the different layers. No. 1, coarse bran; No. 2, brown flour; No. 3, coarse grits; No. 4, fine grits; No. 5, flour.

Proportion of phosphoric acid in the different parts of a grain of wheat.

| | No. 1. | No. 2. | No. 3. | No. 4. | Flour. | |
|---|---|---|---|---|---|---|
| Phosphoric acid combined with sesquioxide of iron.... | 0·042 | 0·047 | 0·037 | 0·015 | 0·019 | p.c. |
| Phosphoric acid combined with magnesia and small quantity of lime..... | 1·485 | 1·259 | 0·657 | 0·329 | 0·144 | " |
| Phosphoric acid combined with potash ..... | 1·071 | 1·046 | 0·459 | 0·280 | 0·758 | " |
| Total, | 2·598 | 2·352 | 1·153 | 0·624 | 0·921 | p.c. |
| Phosphates soluble in water | 1·942 | 1·666 | 0·918 | 0·529 | 0·080 | " |

Thes facts tend to prove that the greater part of the phosphates contained in wheat are not combined with organic matter, but are in the free state; and the greater part is soluble and combined with potash and magnesia, while the insoluble phosphates are represented by lime, iron, and a small proportion of magnesia, the latter salt being probably the neutral phosphate of magnesia, $3MgO,PO_5$, while the soluble salt of magnesia is $2MgO,HO,PO_5$.

These analyses show clearly, that notwithstanding custom and vanity have led us gradually to prefer white to brown bread, or rather, that made with nearly all the constituent elements of wheat, this practice is not the less erroneous, when we consider the nutritive properties of wheat, especially as nourishment for children, for whom phosphates are so essential in the formation of bone and blood.

These views are confirmed by the researches of M. Mège Mouriès, who has shown that there exists, in the interior cortical envelopes of wheat, a special ferment which rapidly converts starch into sugar, and consequently facilitates the conversion of flour in bread, a ferment to which he has given the name *cérealine.* The observations of M. Mège Mouriès led him to devise a particular mode of grinding the wheat and of making bread from the flour thus obtained, and the results were such that he was enabled to obtain from each quintal of wheat: process of Mege Mouriès, 82 flour, 101 bread; ordinary process, 70 flour, 82 bread.

### People who should not Smoke.

In an article on the medical aspect of smoking tobacco in the *Food Journal,* Dr. E. B. Gray asks:

"Is smoking injurious?" This is an every day question apt to be put by patients to their doctors. Like most broad questions of the kind, it involves far too many considerations to admit of being answered by a plain yes or no. A medical man, who has long been a moderate smoker and watched the effect of the habit on himself and others, here offers what he believes to be the true answer to the question.

First of all, there must be an understanding about the quality of the tobacco to be smoked. Bad—namely, rank, quickly intoxicating, and prostrating tobacco (certain kinds of shag and cavendish, for instance) must always be injurious. Few can smoke them at all—none, habitually at least—with impunity. So too with regard to quantity, even good tobacco smoked to excess will to a certainty be injurious to the smoker, sooner or later, in some way or other. Of the various evil efforts of excessive smoking, more will be said presently.

Next, as to the smokers. There are people to whom any tobacco, however smoked, is simply poison, causing, even in small doses, vomiting, pallor, and alarming prostration. Such people never get seasoned to its effects, even after repeated trials; and if they are wise, they will forever let it alone. They will display still further wisdom by not presuming to make laws for others who have not the same idiosyncrasy.

No one can enjoy smoking, or smoke with impunity, when out of health. The phrase "out of health," though it may sound vague, is definite enough to frame a general rule. At the same time, it is useful to know what, if any, are the particular disorders and conditions of health in which tobacco does special harm. As far as the writer's knowledge goes, these have never been specified by medical writers as clearly as is desirable.

To begin, a man with a bad appetite will, if he smoke, most assuredly eat still less—a noteworthy fact for smokers or others recovering from wasting illness or "off their feed" from whatever cause. This effect of tobacco, by the way, while an evil to the sick man who cannot eat enough, becomes a boon to the starved man who cannot get enough to eat; and ample illustration of this was furnished among the French and German soldiers in the recent war. Again no man should smoke who has a dirty tongue, a bad taste in his mouth, or a weak or disordered digestion. In any such case, he cannot relish his tobacco. It should be a golden rule with smokers, that the pipe or cigar which is not smoked with relish had better not be smoked at all. Indigestion in every shape is aggravated by smoking, but most especially that form of it commonly known as atonic and accompanied with flatulence. Diarrhœa, as a rule, is made worse by smoking.

One of the commonest and earliest effects of excessive or untimely smoking is to make the hand shake. This gives the clue to another class of persons who ought not to smoke—persons, namely, who have weak unsteady nerves, and suffer from giddiness, confusion of sight, tremulous hands, tendency to stammer, or any such symptoms. And if tobacco does harm in mere functional weakness, still less allowable is it in actual organic disease of the system; as, for instance, where there exists any degree of paralysis or other sign of degenerative change in the brain or spinal cord. The improper use of tobacco does beyond question somehow interfere with due nutrition of nerve substance. An illustration of this, familiar to oculists and medical men, is the so called tobacco amaurosis, a failure of vision occurring in excessive smokers from mal-nutrition of the retina. Another class of persons who ought not to smoke are those who have weak or unsteady circulations and complain of such troubles as palpitation, cardiac pain, intermittent pulse, habitually cold hands and feet, or chronic languor.

Lastly, there is reason for believing that the habitual use of tobacco is likely to retard the due growth and development of the body. If so, no one should become a smoker till he is well past the period of puberty. Boys, moreover, have no excuse for smoking, for they are spared the hard wear and tear of adult life.

Now, after eliminating those who from idiosyncrasy cannot, and those who from bodily ailment or from tender years should not smoke, there will still always be a large residuum of happy folk who can smoke, enjoy smoking, and are indeed the better for it. These are they who use tobacco without abusing it—use it, that is to say, in moderate quantity, in due season, and honestly for the sake of the comfort which it gives them—a comfort every bit as legitimate as that which drinkers of tea, coffee, or wine extract in each case from their favorite beverage.

### The Detroit River Tunnel.

We are able authoritatively to state that work upon the river tunnel will be commenced at once. Mr. Joy has returned from the East, and will see to it that operations are begun at the earliest practicable moment. All the money required has been secured, organizations have been effected on both sides of the river, which in due time will be consolidated; the City Council has adopted, and the Mayor has approved, the ordinance giving the right of way through and under the streets; and all that now remains is for the engineer to prepare the necessary working plans, set the machinery in place, and go to work. Mr. Cheesebrough, the engineer who constructed the lake tunnel at Chicago, and who made the surveys of the river bed and approaches, and prepared the plan of the proposed tunnel here, will have charge of the work. He is expected here within a few days to complete the necessary preliminary work. The plan of the tunnel contemplates really a series of three cylindrical tunnels. Two of these will be for railroad purposes, each being 18½ feet interior diameter. They will be parallel, and 50 feet apart. This plan is deemed preferable to a single tunnel with double tracks, both on account of less liability of accident to trains and delay from obstructions, and on account of the strength and economy of the structure. The third tunnel will only run under the river, and will be below and midway between the other two. It is designed for drainage purposes only, and will have an interior diameter of five feet. The third tunnel will be constructed first, in order to fully develop the character of the soil which is penetrated, and to drain the other two tunnels as the work progresses. It is expected that the building of the lower tunnel will fully determine the feasibility of the whole project; and this will therefore be completed before work is undertaken on the railroad tunnel proper. If difficulties are met with anywhere, of course they will be underneath the bed of the river, and the drainage tunnel will be likely to encounter them. Their nature, and the possibility of overcoming them if they are met, can then be determined, before any great expense is incurred or property of the city is damaged by excavating in and underneath the streets.

Work will be first commenced on the grounds of the Detroit and Milwaukee Railroad Company, near the foot of St. Antoine street. Here a shaft, ten feet in diameter, will be sunk to the required depth, and excavation under the bed of the river will proceed from that point. As the excavating proceeds, a shell of brick masonry will be constructed in a permanent manner. By the time the middle of the river is reached, if the project still appears feasible, operations of a similar character will be commenced on the other side of the river, and the work will proceed from both directions. The building of this experimental and drainage tunnel, it is expected, will not consume more than two or three months; so that we shall soon know whether or not the proposed railroad tunnel under the river is possible. If the successful completion of the first tunnel shall prove that it is so, work upon the others will be immediately begun and proceeded with, with all possible dispatch. The engineer estimates that a year and a half or two years will be required to complete the work, allowing time for unlooked for delays, and proceeding cautiously and slowly under the bed of the river, where the water is deepest and there is danger. Of course, much depends upon the results attained in the experimental tunnel. If it shall appear that the larger tunnels can unquestionably be built, and without danger or delay, the work will be pushed with all possible dispatch, and probably completed within a year.

The company which has undertaken this project only require to know what is feasible in order to have it completed and in practical operation at the earliest possible moment. The entire length of the tunnel, not including the approaches, will be about two miles, and its estimated cost nearly $3,000,000. When completed, it will be used by all the railroads entering the city.—*Detroit Post.*

### Nitro-Glycerin.

When glycerin is allowed slowly to trickle into a mixture of equal measures of nitric acid and oil of vitriol, at a low temperature, two atoms of its hydrogen are replaced by two atoms of protoxide of nitrogen, and there results a heavy oily liquid known as nitro-glycerin, a body which has more than ten times the explosive power of gunpowder. It has come into extensive use for blasting, and the number of terrible accidents that have happened from it, by explosion from mere friction, illustrates not only the tremendous forces that can be stored up in the shape of atomic tensions, but how exquisite is the balance by which such terrible agencies are kept in equilibrium.

This terrible explosive seems little to respect its company and surroundings. Dr. Gorup Besamez reports the account of an explosion of ten drops of the substance in his laboratory, and the astonishing effects he records as resulting from this explosion are well calculated to give a most respectable and respectful notion of the properties of nitro-glycerin. One of the doctor's pupils, in the course of an investigation, placed the above mentioned quantity of the substance in question in a small cast iron dish heater over the small Bunsen gas burner in common use in laboratories. Result: forty-six panes of glass in the windows of the laboratory demolished, the iron dish hurled through a brick wall, the iron stand upon which it was supported partly split and partly twisted out of shape, and the tube of the Bunsen burner split and flattened. Those in the laboratory, fortunately, escaped without injury. This circumstance confirms the results of Dr. E. Kopp's observations upon the conditions upon which nitro-glycerin explodes or quietly burns. When caused to fall drop by drop on an iron plate at a full red heat, it burns off like gunpowder; but should the iron plate not be thoroughly red, but still sufficiently heated to make the nitro-glycerin boil suddenly, an explosion invariably occurs. The latter must have been the conditions under which the nitro-glycerin was heated in the case above cited. Nobel claims that nitro-glycerin can be rendered perfectly harmless and safe for transportation by mixing it with ten per cent of wood spirit or methylic alcohol. When required for use this added substance must be removed, its removal bringing the explosive back to its original dangerous state. An admixture with twenty-five per cent of its weight of sand will, it is said, allow it to burn quietly without explosion, but if struck with a sudden and violent blow, it takes fire, but only the portion struck burns. Such a mixture, now known as dynamite, may be exploded by means of fulminate of mercury, itself fired by the electric spark or by a slow match.

### Packing for Oil Wells.

In pumping oil, it is customary to apply a pump to wells separately from the oil pump for the purpose of drawing off the gases and relieving the oil, in the crevices of the rock beneath the pump tube, of atmospheric pressure, or for causing a vacuum. It is not unfrequently necessary to withdraw the tube for repairs or other purposes, and when this is done the air rushes down and fills the vacuum, driving back the oil and causing much trouble and expense in getting it back, when the tube is replaced and the pump is again put in operation. In fact, oil wells are sometimes ruined by withdrawing the tube and subjecting the oil in and below the well to atmospheric pressure. An important invention, devised by Henry S. Cate, of Deerfield, Pa., consists in preserving the vacuum by preventing the ingress of air. He employs a disk of rubber, or other elastic material, confined between the two metallic annular rings, on the collar of the casing, by means of clamps or in any other suitable manner. Through the center of the rubber packing there is an orifice smaller in diameter than the tube, but through which the tube passes air tight, by reason of the elasticity of the packing.

The bearing of the metallic rings is on the outer edge of the packing, so that the latter can contract or expand nearly its entire width from the center. In drawing up the tube through the elastic packing, the latter will be drawn up around the tube in the form of a truncated cone, which will withstand the pressure of the atmosphere and preserve the vacuum beneath. The packing will expand for the collars and thimble of the tube to pass and contract again to the tube, thus keeping the connection all the time air tight.

The inventor does not confine himself to this particular mode of applying packing to the tube for the purpose named, but claims any equivalent device.

### Steam Navigation on Canals.

A correspondent sends us an account of the canal steamer *Andrew H. H. Dawson,* in which he states that the vessel went from Albany to Buffalo in 8½ days, with a cargo of 180 tuns; and returned with 1,400 bushels of corn and 6 tuns of coal, about 190 tuns in all, from Buffalo to Troy, in 7 days. Her dimensions are 96 feet x 17 feet 2 inches, depth 9 feet, her ends are very full, and her draft is 5 feet 4 inches. She has an engine with cylinder 12x12 inches, and an ordinary screw propeller located in the center of the bow. She has accomplished 3 miles an hour, under 80 lbs. of steam; and made the better time, the greater the depth of water she was in. The writer claims for the "Dawson" that she creates no swell or wave whatever, and that the screw produces a current under the boat. Many other improvements are attributed to her, and as she is an experimental vessel, she may yet be much improved upon.

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### Improved Turbine Water Wheel.

The invention, of which our engraving gives an excellent representation, is designed to direct and control the flow of water upon the buckets in a more efficient and convenient manner than can be done with the devices for the purpose heretofore used. The principal feature of the invention is the employment of movable chutes, in connection with stationary chutes, to direct and control the currents of water as they enter the wheel, the parts of the invention and their operation being as follows:

Fig. 1 is a perspective view with a portion of the top annular plate broken away, the better to show the construction of the parts. Fig. 2 is a sectional and plan view of a portion of the device, showing the adjustable chutes.

A represents the immovable bottom plate, to which are attached the plates or chutes B, which direct the water toward the center at right angles, and upon the face of the buckets.

C represents an annular top plate, bolted to a spider, D, which latter turns freely on the wheel shaft, together with the annular plate, C, and the plates, or chutes, E, bolted to the under side of the annular plate, C, whenever actuated in the manner to be described.

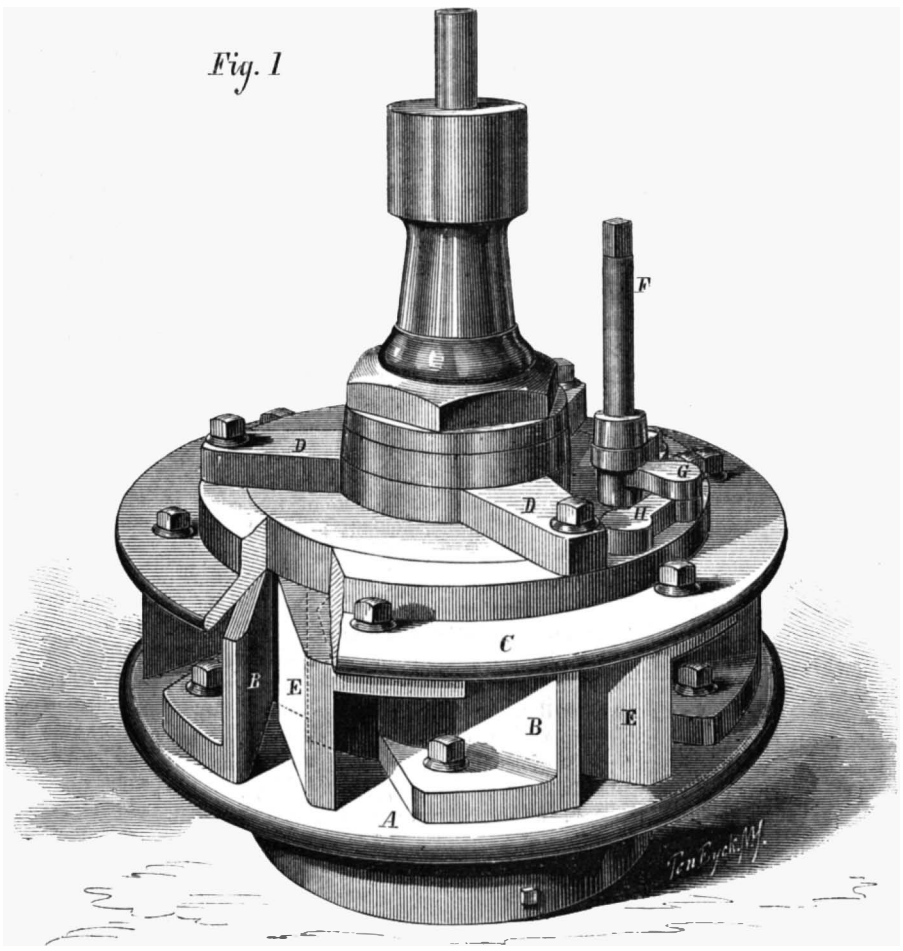
The partial rotation of the annular top plate, C, about its central axis, causes the chutes, E, to approach or recede from the fixed chutes, B, thereby enlarging or contracting the water courses between them, or shutting them off entirely when the two series of plates are brought close together.

This movement is accomplished as follows:

The vertical shaft, F, which has its bearings in the fixed central disk within the annular top plate, C, and in a lug bolted to the disk, has extending from it an arm, G, and this arm is connected to the annular plate, C, by a link, H, pivoted to the arm, G, and the top plate, C. Therefore the rotation of the shaft, F, causes the top plate to move partially about its axis according as the shaft, F, is rotated to the right or the left by a lever at the top.

The pressure upon the chutes being upon both sides of them, as the water enters the wheel from the usual vertical trunk or pipe, the movement is not difficult, and the link and arm, acting like a knuckle joint, give all the necessary power to close the chutes.

Fig. 1




Patented through the Scientific American Patent Agency, Oct. 3, 1871. For further information, address R. Bryant & Brothers, West Chesterfield, Mass., or John Humphrey & Co., Keene, N. H.

## BRYANT'S IMPROVED TURBINE WHEEL.

### Gardner's Improved Steering Apparatus.

Mr. John Gardner, of New York city, has invented a new Ship's Steering Apparatus to be used more especially when the rudder post is set roking or inclined. The upper end of a raking or inclined rudder post, is made polygonal in form, and passes up through a hole in the bottom of a box or casing and fits into a hole in a large bevel gear wheel, so that the rudder post can rise and lower with affecting the operation of the steering apparatus. The bevel gear wheel revolves upon the bottom of the box or casing, and into its teeth, upon its front and rear sides, mesh the teeth of two bevel gear wheels, one of which wheels is rigidly attached to a counter shaft. The other wheel is run loosely upon this shaft, and serves simply to hold the wheel down to its seat and give steadiness of motion to the gearing. The shaft is placed at right angles to the axis of the rudder post, and its journals revolve in bearings attached to or formed in the box or casing. To the counter shaft is attached a gear wheel, into the teeth of which mesh the teeth of a gear wheel attached to the shaft of the steering wheel the journals of which revolve in bearings attached to the box or casing. The gear wheels are beveled more or less to correspond with the angle between the shafts. The steering wheel is thus always vertical, and consequently in the best positionto be operated by the steersman.

### The British Coal Fields.

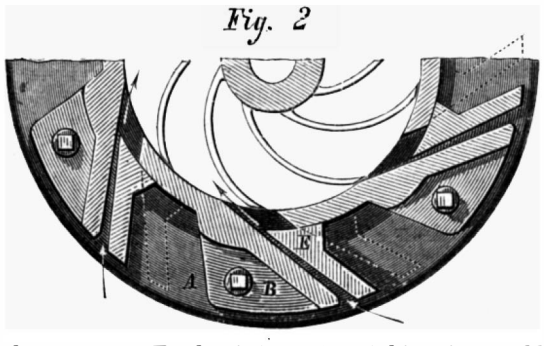
A statement, hazarded some years ago by a Mr. Jevons, as to the probable exhaustion of the coal fields in Great Britain at no very distant date, succeeded in calling public attention in that country to this most important question; and practical action was taken by the appointment of a Royal commission of scientific men to investigate and report on the whole subject. The final report has just been issued, and is a valuable and exhaustive document.

The statement of the Commissioners, on the main question, is as follows: The coal fields, now known to exist, will maintain the present supply and provide for the increased demand which experience has taught the coal owners to expect, for the next 277 years. If there be no increased use of coal, the supply will be sufficient for 1,300 years. In calculating the available coal fields, the Commissioners have recognized the fact that the heat, at a depth of 4,000 feet, forbids the laborers to go lower, the temperature being 105° Fahr., in which no man can work for more than a very few minutes at a time. The total quantity mentioned in the estimate reaches the astounding figure of 146,480,000,000 tuns, which, as has been already stated, will last 277 or 1,300 years, according to whether the demand is stationary or increases in its usual ratio.

The good effects of this inquiry have already been seen. The enormous heaps of waste coal (slack), which lie around the pits' mouths in the mining districts, have set inventors to work to utilize them as fuel, and the locomotives in France and Belgium are generally fired with compressed bricks of coal made from this dust. Improved methods of reducing iron and other ores, and of manufacturing metals, will do much to keep the consumption from growing beyond reasonable limits. But before these fields are exhausted, it is probable that steam will be superseded altogether. If the result of the ever vigilant search through the mysteries of nature, which the scientific men of the present day are pursuing with such unfaltering zeal and activity, will be to utilize light, solar heat, electricity, or magnetism, as motive power, we cannot tell; but one thing is certain, that the supply of either of these forces is practically infinite.

The Commissioners have not investigated the question of coal fields in Ireland, although the world has long been aware of the existence of large beds of the valuable mineral

Fig. 2




in that country. Further information of this point would be of great interest, and the development of a coal industry might affect the future of Ireland to an important extent.

### Imitation of Leather.

This is an age of imitations; and the sham is so often taken for the real that even judges themselves have been misled. In manufactures, there is such a constant demand for something new that the best energies of man are severely taxed to meet the requirements of the hour, and it is surprising to many how promptly this craving is satisfied. As an instance of the extending power of the imitator's art, which will be interesting to carriage trimmers, we have noticed that Messrs. Elkington & Co., of Birmingham, have arranged to produce, by the electrotype process, imitations of the choicest grains of leather. They say that the system of producing leathers in exact *fac simile* of morocco, seal, and other skins, by means of electro-deposited copper rollers, has now become an established branch of leather manufacture. The fine grain of the most rare and valuable skins can, by this process, be reproduced at a merely fractional cost, as compared with the ordinary imitations.

The system, as described by the *Mechanics' Magazine*, is as follows: An ordinary machine roller is fitted with a mandrel, upon which is deposited, by a new process, the copper *fac simile*. The latter is an exact copy of any rare or choice skin required to be reproduced, and it is only by a recent improvement in electrotyping that the difficulty of depositing upon such a substance as leather has been surmounted. An ordinary skin can thus be impressed with the beautiful surface of morocco skin, even to the finest variations of grain, and several thousand may be copied by one deposit. In all cases the actual skin required to be copied must be sent. These rollers are supplied ready for the machine; or, if preferred, manufacturers may send their own mandrels, and have the *fac simile* deposited thereon.—*The Hub.*

### Kennedy's Improvement in Wrought Iron Columns.

Mr. John P. Kennedy, of New York, has patented an improvement in the construction of wrought iron columns, in which he constructs triangular columns, or girders of longitudinal bars connected together by cross bars and diagonal braces, to obtain the greatest strength with the least weight of metal, and to provide an arrangement for the construction of large columns of great length, whereby they may be made up of sections, which, being prepared for riveting together may be conveyed, to the place where the columns are to be erected, in pieces or packages of pieces, and there put together. The said columns are made in triangular form in cross section because it gives greater strength with a given weight of metal than any other form, and is claimed to be the best manner of combining the longitudinal and transverse bars and braces.

Rolled T bars are used for the longitudinal bars, having one at the apex of each angle, and are placed so that the vertical parts of the T bars are on radial lines of the axis of column, while the head of each bar is parallel with the side corresponding to the base of the triangle, in the apex of which the said bar is. The cross bars and braces have the ends suitably bent to fit the sides of these parts, and are riveted to them. The head of one of the bars of a column of this kind, being suitably arranged relatively to the cover of a gas holder, will serve as a guide for the wheel of the holder.

Instead of the ordinary T bar, in some cases two angle bars are used, by riveting them together so that the united flanges form the head; while the plates, which are considerably wider than said flanges, form the vertical part of the bar, and may be supported from the inner edges about half way to the top of the T, and arranged on the angle of the sides of the column to receive the ends of the cross bars and braces.

The columns are provided with suitable cast iron or granite bases, and may have cast metal or other ornamental capitals. Columns constructed in this way may be extended in length indefinitely, the longitudinal bars being spliced at the ends and "breaking" joints.

### Slag Cement.

The composition of the slags of the blast furnace should be for the most part as follows to obtain from them a good cement. Essential elements: silicic acid, 40·28; clayey earths, 15·13; calcareous earths, 36·24. Non-essential elements; manganese, oxide of iron, alkalies, etc., 8·35. One part of these slags in fine powder is sprinkled, and agitated in a suitable vessel, with two parts of an equal mixture of hydrochloric acid (35 per cent HCl) and water. The slags decompose, a lively disengagement of HS taking place. The mass finally forms a thick jelly, from which water removes the chlorides completely. After removing these, the residue is dried and reduced to an impalpable powder; one part of this powder, intimately mixed with nine parts of slags in powder, gives an excellent cement in water or air, as it may be desirable to apply it.

A SIMPLE METHOD OF ENAMELLING CAMEO PICTURES.—Ordinary well polished glass plates are coated with normal, collodion of the usual description, and when the film has set perfectly, but has not become completely dry, the pictures, which have previously been trimmed and finished, are dipped rapidly into alcohol, and applied without delay to the plates. The prints are pressed and rubbed down with smooth writing paper, and the operation of mounting is proceeded with as soon as the backs of the pictures have become white, or, in other words, as soon as the alcohol has again evaporated. The cardboard should be allowed to remain in water for at least half an hour previously to its being employed for mounting. The more rapidly the pictures are applied and pressed upon the collodion surface, the more beautiful will be the finished result.—*L. G. Kleffel, in Photographic News.*

PHOTOGRAPHIC IMPRESSIONS WITH FUCHSIN.—A piece of linen goods colored with fuchsin and dried, was exposed to the light under a photographic negative, when the image of the plate became visible on the goods, the picture looking greyish and faded where the lights were strongest. Still the picture was rather weak, and the goods were soaked for two days in a bath of sulphate of copper, when the picture was found to be more developed. After several rinsings in water, and two days exposure on the grass, the rest of the goods was bleached white, leaving the picture of a pure violet tint on a white background.—*E. Demoulin.*

PLUMBAGO IN WYOMING.—Messrs. Kelly, Wallace & Co., of Cheyenne, Wyoming, write to inform us that, at a place 50 miles north of that city, large deposits of plumbago, of a nearly pure quality, have been discovered. The district is known as the Black Hills, and the valuable mineral has excited much attention and curiosity throughout the neighborhood.

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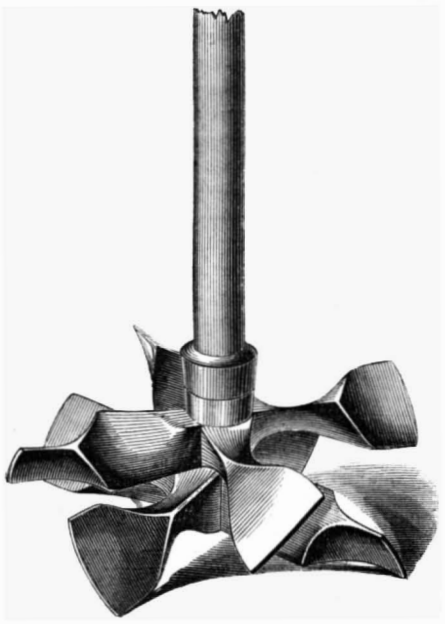
### CHURN DASHER.

Our engraving shows an improved churn dasher, for which it is claimed that it so thoroughly agitates the cream or milk that not only is the butter separated therefrom with greater ease and rapidity, but that a larger quantity is obtained.

The form of the dasher is well shown in the engraving; it will be seen that, instead of the usual flat and sometimes perforated blades, it is provided with blades of double, but oppositely inclined, planes, so placed that the current made



by the action of one inclined surface is met and broken, by the action of another surface inclined in another direction.

The result is that when the dasher is moved up and down with the proper force, a violent agitation of the cream or milk is produced, the air being carried under the surface and thoroughly aerating the fluid.

This modification of the old churn dasher, which has yet held its own against powerful competition, will doubtless strengthen the hold it has retained upon the favorable opinion of dairymen. The inventor claims that the same principle of construction is equally adapted to revolving or other kinds of churns.

Patented, through the Scientific American Patent Agency, Sept. 7, 1869, by Miles Fisk, whom address at Adrian, Mich.

### Moritz's Jacks for Replacing Cars.

Mr. David Moritz, of Black Rock (Buffalo), N. Y., has invented a traversing jack for replacing cars, which is to be applied to railroad cars, for the purpose of replacing them upon the rails when they are run off the track. To a portion of the car body is attached a bed plate, on which a cross head or bar shaped frame, attached to the jack, traverses. The cross head is provided with double flanges which embrace parallel rails or sides of the bed plate, and is provided with friction rollers to facilitate its movement. Both the bed plate and cross head are suspended from the car by the jack. The screw of the jack works in a nut affixed to the car body. The nut is swiveled in a shell affixed to the car, and is, by toothed wheels, connected with an upright shaft, which carries a hand wheel. By turning this wheel, the nut will be revolved to work the screw up or down, and thereby raise or lower the jack. A ball-joint forms the connection of the nut with the cross head, permitting the jack to rest in an inclined position on uneven ground. From the car is also suspended, by a ball joint, a vertical shaft which passes through a pinion, hung between ears formed on the cross head. The pinion meshes into teeth formed on the inner side of the bed plate. The vertical shaft can slide up and down in the pinion, and is connected by feather and groove to the pinion. This connection enables the car to be elevated without throwing the pinion out of gear.

The operation is as follows: When a car, having one of these jacks near each end, runs off the track, the bed plate at the off end is lowered by means of the screw, and, after it has reached the ground, the nut is still turned to raise the wheels of the car from the ground. The end of the car is then entirely supported by the jack. By next turning the vertical shaft, by means of a handle fitted to its upper end, the pinion will roll along the rack and carry the cross head and end of the car horizontally until the wheels of the latter are again above the rails. The car is then again lowered upon the track, and the bed plate raised off the ground. The nut can be locked, to hold the bed plate elevated, by means of a pawl, catching into a ratchet wheel, on the shaft.

### Milroy's Method of Constructing Foundations.

Mr. John Milroy, whose name is so well known in connection with the excavator he has brought into extensive use, has invented a method of constructing piers or foundations of concrete or brickwork. The arrangement embraces two special features, one referring to the construction of the piers either in complete circular or segmental sections, and the other to the use of a curb or shoe to be used with them. Each section is founded on a platform, and within a frame, which may be constructed of wood and built up in segments. The ring is shown as formed with a mortice at one side, a tenon being placed at the other, for connecting or locking together a series of columns or cylindrical piers when constructing foundations for a continuous pier or quay.

A holder is employed in lifting the rings, and it consists of a three armed frame having levers jointed to the outer ends of the arms, and connected by chains to a central ring; those connecting chains are of such length that, when lifting force is applied to them the strain tends to draw in the upper ends of the levers, and force out their lower ends, which are shaped to catch in cavities formed for the purpose in the bottom edge of the ring; and when the latter is being lifted, the strain acting as described, prevents the levers from being loosened or displaced. When the ring has been lowered into its place, the upper chains are slackened and the lower ends of the levers are drawn inwards clear of the ring by means of three chains connected to their lower ends.

The rings are joined together with Portland cement, either by laying a bed of cement in the usual way, or, after a ring has been lowered into its place, the joint between it and the one next below it is pointed with cement round the inside and outside, and cement is then run into vertical holes made in the rings for the purpose, and rammed well in so as to spread throughout and fill up a small space left for the purpose between the two rings. Bricks may finally be inserted in the holes, to act as dowels between the rings, and thus prevent any movement of them upon each other.

The curb or shoe consists of a thin cylindrical shell easily sunk, and presenting a sharp and elongated entering part, while, from the space within elevation is accomplished without difficulty. The cylindrical shell is surmounted by a flat annular plate, the outer edge of which corresponds with and joins the top of the shell, and it is, in addition, supported by radial brackets or feather plates fixed or formed in the angle inside the shell. The bottom course of the pier rests upon the annular plate, and is fixed to it by bolts.

### COPSON'S IMPROVED CORN BROOM.

The object in making this invention has been to improve the manner of attaching corn brush to the handles of brooms, so that if, by any means, the circumference wire should be broken, or the tack which holds it should work out, the wire will still be held securely, confining the brush as before.

To effect this desirable result, use is made of extra braided wires combined with the outer surface wire, as we proceed to describe, referring to the accompanying engraving.




A is the brush of the broom, arranged and applied to the handle, B, in the usual manner. C is the outer wire wound around the butts of the brushes. The end of this wire is secured by the tack, D, in the common way.

Extra braided wires, E, are bent and looped around one of the lower coils of the outer wire, the extra wires being passed alternately over and under the successive coils, and crossing each other between the coils, as shown.

The ends of the braided wires are bent back around the upper coils of the outer wire, and driven into the handle.

The braided wires thus hold and bind the coils, so that should the tack, D, work out, or any part of the outer wires be broken, the brush is firmly held. Four, more or less, of the braided wires may be used as deemed convenient and tasteful.

A patent has been ordered to issue, through the Scientific American Patent Agency, to R. E. Copson, whom address, for further information, Hamburg, Iowa.

### How to Photograph a Tracing without a Camera.

I laid out several thicknesses of cloth, on a smooth drawing board, on top of which I placed a sheet of sensitized paper, superimposed the same with the drawing, right side up, and pressed the whole down perfectly smooth with a piece of glass which was kept in place by clothes pins and weights, and exposed it under the skylight until the edges of the paper showed a sufficiently dark impression, when it was removed, toned, and fixed. In this manner an exact copy of a drawing can be made, the only difference, as a matter of course, will be, the lines will be white and the body of the paper dark, which is of no disadvantage whatever.—*Anthonys Photographic Bulletin.*

### Davis' Spirit Level, Plumb, and Inclinometer.

The manufacture of this well known and valued instrument was commenced in a small workshop, and has increased in importance till it now occupies a factory costing $70,000. All these instruments are made and adjusted by machinery, so that uniform accuracy may be relied upon. The maker not only furnishes the best article in this line we have seen, but, by improved machinery, is able to supply the trade at as low prices as other manufacturers who sell an inferior article. To all dealers in or users of such instruments, we recommend that they send for a pamphlet, giving prices and testimonials from a large number of practical men who have them in use. See advertisement on another page.

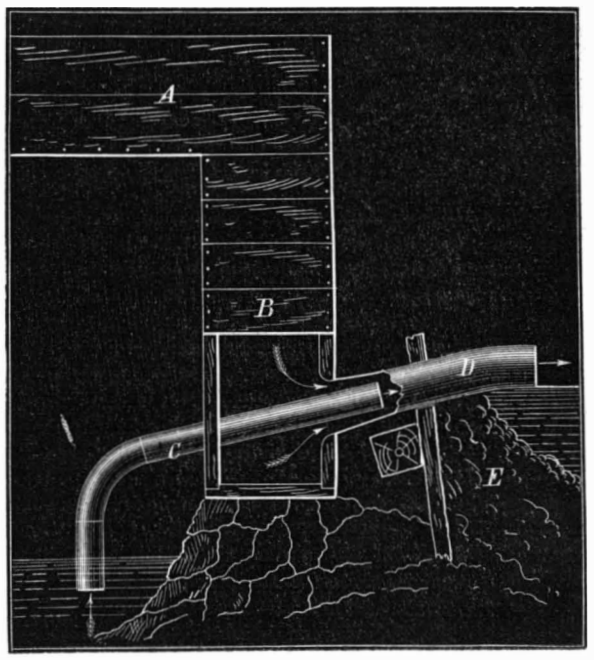
## Correspondence.

*The Editors are not responsible for the opinions expressed by their Correspondents.*

### Device for Raising Water.

*To the Editor of the Scientific American:*

Having learned by experience the value of the device, for raising water, of which I send a sketch, I wish to offer it




through your columns for the benefit of "our" mechanical family. Millwrights often work at a great disadvantage from the difficulty and expense of removing the water from the foundations of their mills during construction; this device will in many cases remove that difficulty at a very small cost. The whole thing can be made by any good carpenter with a few planks and pieces of stove pipe.

In the sketch, the side of the penstock is removed to show the arrangement of the suction and the discharge pipes.

A is the flume, B, the penstock, C the suction pipe, D, the discharge pipe, and E the coffer dam.

The suction pipe, C, extends a few inches into the discharge pipe, D, which, taking water from the penstock, B, surrounds the end of the suction pipe with an annular jet of water which draws with it the water in the suction pipe. In practice, I find that, with a head of 8 feet, a 10 inch discharge pipe draws the water through a six inch suction with such force as to carry cobble stones with it, while lifting the water three feet, developing also a powerful appetite for mud, gravel, etc. Will some scientific man tell us how far water can be drawn by this device with a given head?

G. W. PEARSONS.

Potsdam, N. Y.

[This device is described in Ewbank's "Hydraulics and Mechanics," and is used in Australia for mining purposes. A description of this application of it will be found in another column. Various other uses for so cheap and simple an arrangement will suggest themselves to our readers.—EDS.

### Treatment of Colorado Ores.

*To the Editor of the Scientific American:*

I notice, in your paper of September 16, a letter from Mr. Thomas J. Lee, asking some information in relation to the treatment of Colorado ores. This is an old subject with me, as I visited the Territory in 1865, and formed the opinion which is expressed below. At that time, no proof could be brought forward, for there were too few assays of ore in quantity to form any basis for proof. But I think the publication of the United States Report on the Geological Exploration of the 40th Parallel by Clarence King, (vol. 3, by Mr. Hague, his assistant), offers pretty conclusive proof that the Colorado ores are not, in general, milling ores. There is proof of this in the experience of mill men there, and reason for it in the theory of amalgamation. The future of Colorado is a future of smelting, and all operations in any other direction seem to me to be wanton waste, so far as the ores found near Central City and Georgetown are concerned. Mr. Lee is therefore right in looking to concentration for success, and there is nothing to prevent very successful and thorough concentration.

It was long ago pointed out that mercury has but little affinity for gold, and that the so called "amalgamation" method of extracting that metal from its ores is really a mechanical and not a chemical process. The principles on which the separation is accomplished are easily explained. If we have a substance composed of two elements, one having a specific gravity of 5 and the other of 10, it is easy to see that if we can provide a liquid with a density of, say 7, the latter element will sink in it and the former cannot. To accomplish the separation of the two, we have only to crush the substance to a certain fineness and place it on a bath of the liquid. As soon as each particle of gravity 10 comes in contact with the liquid, it will sink in it, and we have only to agitate the sand until every particle is brought to the surface of the bath. We shall then have the two elements separated, one on the top and the other at the bottom of the liquid.

This is precisely what takes place in the so called amalgamation of gold ores. Gold has a specific gravity of 19·33, and mercury a density of 13·6. The iron pyrites in which the gold of Colorado is found, have a gravity of about 5, and the quartz, which is another constituent of these ores, a gravity of 2·5. It would appear, then, that in a mixture composed fo

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gold, 19·33 sp. gr., and pyrites, 5 sp. gr., there should be no difficulty in effecting the separation, when the ore in a finely divided state is passed over mercury in which the gold can, and the pyrites cannot, sink. There is no difficulty in satisfying the mechanical conditiitions. That was done centuries ago, and the simple machinery employed never fails in its action when properly used.

There is a difficulty, however, in treating gold ores by separation by means of mercury, and in the explanation of that lies the reason of the troubles experienced in Colorado. Native gold is rarely or never pure; it is alloyed with silver, which has a specific gravity of 10·56. A simple sum in proportion will satisfy your readers, that, when the amount of silver reaches 35 per cent, the alloy has the same specific gravity as mercury, and therefore cannot sink in that fluid. It cannot, in other words, be "amalgamated." The question then simply is: Do the ores of Colorado contain more than 35 per cent of silver? The owners of the mines, whenever questioned, have lustily denied that their ores contained any such percentage of silver; but Mr. Hague's report on the mining industry of that, among other, Territories, conclusively proves that they do. The following proofs of this fact are not the results of assays on picked or casual samples, but are the actual buying and selling assays of lots of ore delivered at smelting works. Thirty-five per cent of silver I will call the normal alloy, though, for working, the percentage of silver would have to be less, or it would be as likely to swim on as to sink in mercury.

| | Gold. | Silver. |
|---|---|---|
| Normal alloy | 65 | 35 |
| Consolidated Gregory ore, = gold, 5·6 oz; silver, 20 oz. = | 22 | 78 |
| Illinois lode " " 4 " " 20 " " | 16 | 84 |
| Gardner " " " 3½ " " 11½ " " | 23 | 77 |
| California " " " 3 " " 18 " " | 15 | 85 |
| Burroughs " " " 6 " " 12 " " | 33 | 67 |

It should be remarked that the return from the Illinois lode was thought to be exceptionally rich in silver, but it is not very different from the others which are not exceptional.

These returns are all from first class ore, but the common milling rock contains the same proportionate amounts, the richness of the ore being reduced by the displacing of a certain amount of gold-bearing pyrites by barren quartz. This is proved by the average of large quantities of milling ore as follows:

Average of 1,340 tuns Burroughs ore: gold, 1 oz., silver, 4½ oz.; or gold, 18, silver, 82. Average of 2,056 tuns from various mines, gold, 4½ oz., silver, 11 oz.; or gold 30, silver, 70.

It should be observed that the nine mines, from which these 3,400 tuns of ore came, all delivered ore which contained far more silver than gold. Not one can supply an ore containing more gold than silver. It is therefore apparently impossible to amalgamate Colorado ores, and yet it has been and is done. The reason is that the alloy in these ores is very rarely uniform in composition. The ore may even contain free gold, together with the alloys. Such ores would yield a part of their gold and retain a part. Mr. Hague estimates the yield in the Colorado mills at 55 per cent, and thinks that 15 per cent more may be obtained from the tailings. My own observation would put these figures very much lower, but, as they stand, they show the correctness of the explanation I have given of the impossibility of thoroughly treating alloys of gold by amalgamation. Mr. Hague says of the experience in Colorado: "It has already been shown that by the ordinary mode of crushing and amalgamating, about 50 or 60 per cent of the gold contained in the ore is extracted, while nearly all the silver and nearly all the copper are allowed to be wasted."

Under these circumstances, it would be natural to expect that inasmuch as a less amount proportionately of the silver than of the gold has been removed from the ore, the tailings will contain a larger proportion of silver than the original ore. This is not found to be so in Colorado. Eight samples of tailings from various mines assayed 21 gold and 79 silver; eight others, 38 gold and 62 silver. The reason of this probably is that some of the silver exists in the form of proper silver minerals, which are mostly brittle and easily lost in concentrating; only a part being alloyed with the gold. The great fact that the ores of Colorado contain too much silver to be susceptible of thorough amalgamation remains reasonable from simple and well known mechanical laws, and is proved by experiment.

These facts are not new. The requirements of amalgamation have long been known and submitted to abroad. Nor is this the first time they have been brought forward in connection with the Colorado question. But the mine owners have, so far as my experience goes, systematically resisted all efforts to ascertain the truth, roundly asserting that their ores contained very little silver, much less in fact than 35 per cent. They were unable to separate the "retort" from the ore, and thought if the bullion they obtained was nine tenths gold, the remainder left in the tailings must be the same. Mr. Hague's study of the subject may call them to their senses, and his book is certainly the most useful publication we have on Colorado ores.

New York city. JOHN A. CHURCH, E. M.

### Influence of the Moon on the Durability of Timber.

*To the Editor of the Scientific American:*

On page 244, Vol. XXIV., you published my report of an experiment on the question "Has the Moon any Influence upon the Durability of Timber?"

One year ago (Sept. 3, 1870, page 148), D. A. M., of Cincinnati, Ohio, expressed himself, through your paper, as being quite certain that hickory timber cut three days after the new of the moon will not decay, or become worm eaten for a long time; while if the same timber be cut in the full of the moon, it will become worm eaten in a few months.

It is now over a year since I cut two hickory sticks, three days after a full moon, marked them, and placed one in the ground out of doors, and the other in an old garret. Three days after the next new moon, I cut two more sticks, similar to the first, marked them, and placed them beside the first.

I send you a section of each, properly marked, by which you will see there is no perceptible difference between those cut in the old, and those cut in the new, of the moon.

Wallingford, Conn. D. E. S.

[The specimens sent show no difference, and we regard the experiment of our correspondent as conclusive.—EDS.

### Psychic Force.

*To the Editor of the Scientific American:*

As the question of psychic force is occupying the attention of scientific men, I would like to ask some one interested to tell me what power it is by which the somnambulist can see with his eyes closed, or by which he can see in the dark if they are not closed, to perform the feats that are ascribed to him? Is this psychic power, or anything akin to it? I once heard a candid man relate an incident. When he was a young man going home late in the evening, barefooted, after the labors of a warm day, it became excessively dark; he stepped upon something which proved to be the uncovered wrist of a drunken man lying in the road, which startled him. He instantly saw, notwithstanding the extreme darkness, what he had stepped upon. He saw that it was a stranger, and could and did describe him, sufficiently to identify him to a party of men whom he soon met on horseback, hunting for their drunken friend. He returned with them to the spot, only to find the object of their search by groping and feeling about, although the horses indicated his presence by their snuffing. What enabled him to thus see the man in the dark? Was this psychic power, or did his fright have the effect of dilating the pupil of the eye so that he could see, on a principle similar to that by which some nocturnal animals can see in the dark? Or was it all unreal?

September, 1871. L. R. W.

### A Practical Engineer's Experience with Steam.

*To the Editor of the Scientific American:*

On page 179, September 16th, current volume, is a communication on steam boiler explosions, from D. A. Morris, in which he explains the true cause of the majority of explosions. I am an engineer of some experience, and I find if my boilers are tight, and I shut down my engine for a short time, no water going into the boilers, so that everything is at rest in the boilers, when I start my engine, the steam will invariably rise in the boilers, so as to show more pressure on the pressure gage.

I remember well on one occasion, when I was engineer on the tugboat *H. P. Clinton*, on the Saginaw river in 1862, we were laying out on Saginaw bay, waiting for some vessels we were expecting; my boiler was very tight, and I had pumped it up to the fourth try cock; we lay about twenty-five minutes with sixty pounds steam, when we sighted two vessels, and we started, and the engine did not make more than ten or twelve turns before the steam showed eighty pounds on the gage; and I dropped the damper, and we did not get 100 rods when the steam had got to ninety pounds, and the safety valve blowing off vigorously.

My remedy is, when I stop my engines, to always have feed water entering the boilers, or the steam blowing off slightly. If you think this worth notice, it may save some valuable lives. S. J. DIETER.

Saginaw City.

### Seeing under Water.

*To the Editor of the Scientific American:*

Your correspondent, A., upon page 181, current volume of the SCIENTIFIC AMERICAN, described a plan which will enable a person to see under water to a considerable depth, and concluded the article with a suggestion that submarine observations be conducted upon the same principle from on board the *Great Eastern*.

When the preliminary soundings along the Atlantic telegraphic plateau were in progress, I thought out a scheme for examining the bed of the ocean. The proposed outfit consisted of the following named articles: Two stovepipes ten inches in diameter and 100 feet long, lashed and braced side to side, and submerged in a nearly vertical position, several mirrors for reflecting sunlight into one of the pipes, and a first class marine telescope with which to carry on observations through the other pipe.

The limited experience which I have had in sixty-five feet of water, through two short lengths of pipe and with a pair of opera glasses, convinced me that the plateau can be seen and many portions of it minutely examined.

Submarine engineers can facilitate the construction of piers and breakwaters by the stovepipe arrangement. The device is not patented—it is free to all. R. B. S.

### Watch Case Springs.

*To the Editor of the Scientific American:*

I recently saw a communication making complaint of the steel case springs for watch cases; also a reply giving directions for putting in. I have found the following to answer my purpose better, with less breakage. First, draw the temper in all springs; never put one in without. If it needs fitting, do it. Then cover the spring with soap, heat to a bright red tempering heat, and throw it in oil. The soap should scale the spring, leaving it white. Then draw to a blue, polish and draw again to a blue, and again polish and draw to the blue, and the spring is ready for the case. It is a well known principle that steel should be at a neutral temper, neither hard nor soft. If the jeweller will try this, he will not make any more brass springs. R. B. FREEMAN.

Watkins, N. Y.

### How to Construct an Inexplosive Lamp.

*To the Editor of the Scientific American:*

I have waited patiently for six months to see what remedy scientific men would offer as a preventive to the explosion of lamps from the use of burning fluids. I am fully convinced that the desired improvement does not lie in the direction of a change in the character of the fluid used, so much as in the manner of using it. Carburetted hydrogen mixed with oxygen of the air will ever be explosive—no matter from what it is generated; and we must have the carburetted hydrogen before we can have the light. Now I will, by experiment, prove that a combination of hydrogen and oxygen can be exploded in any lamp, whether of glass or metal, with perfect safety, provided the outlet to the lamp is left so that the expansive force of the ignited gases find this much the weakest part of the vessel. For instance, fill a strong glass decanter, of one quart capacity, with equal volumes of olefiant gas and oxygen. Fill over water, leave a gill of water in the bottle, and cork it with a well fitting cork. Immerse a small piece of tissue paper in naphtha or petroleum; roll in this paper one grain of potassium, so that the water left in the bottle shall not come in contact with the potassium for some minutes. When all is ready, drop the paper and potassium into the bottle of mixed gases, force in the cork to a level with the mouth of the bottle, and set upon it a pound lead weight in the shape of a Minié ball. The instant the potassium ignites, a violent detonation takes place, and your lead weight goes up 100 to 150 feet. Probably you may not find your cork; but your glass bottle is unharmed. This experiment you may repeat 100 or 1000 times with no damage to your glass bottle. You may try the same experiment upon an ordinary glass lamp, with the same results, if you will leave off the leaden weight, using only a close fitting cork.

For more than twenty years I have made these illustrations before my classes in several colleges of the West and South, holding the glass vessel in my hand ungloved, and have never had a well annealed glass vessel to be shattered, although the report is deafening. The reason why the process is harmless, is, that there is a ready exit for the force, with no necessity for rupture.

Now, how simple to arrange a lamp upon a perfectly safe principle! The oil vessel may be of the ordinary shape, except that the neck be long enough to hold fast the burner (made to fit it securely by grinding the glass), after the manner of a stopper. Then, should an explosion take place, the only damage that can possible accrue will be to throw out the burner and inflamed wick together, and this would not, in one time in one million, set fire to the fluid, or break the oil vessel.

The gases I have named (olefiant gas and oxygen) seem to exert a greater force than any other—greater, at least, than common oil gas and atmospheric air. I have proved my theory correct 500 times in 20 years upon these gases, as well as on chlorine and hydrogen, binoxide of nitrogen and hydrogen, etc. Now this is just the thing required for both economy and safety. No screw on the burner. I do not want any patent for it—nor do I want any one else to have one. I know what I say, when speaking of the safety of it, and do not care what oil is used. J. M. PARKER,

Professor Mathematics and Physics, La Grange College, Mo.

### Half the Cost of Steam Power Saved.

*To the Editor of the Scientific American:*

A series of experiments, which I have recently tried, proves that half the fuel now consumed in the production of steam power can be saved, by using the heat that escapes, in the exhaust steam from an engine, to produce additional power. In the experiments tried, the exhaust from the twenty horse engine (that drove the shafting in the shop where the trial was made) was used, and the heat which this exhaust steam contained was sufficient to drive another twenty horse engine, with the mill to which it was attached, developing as much power as the engine whose exhaust was used. The apparatus with which these surprising results was produced is very simple, and can be attached to any engine now in use. It consists of a plain tubular boiler, ten feet long and twenty-six inches in diameter, with seventy 1¾ inch iron flues in it. This boiler was filled with the bisulphide of carbon, and set in an upright position. The exhaust steam was passed through the flues, entering at the top end, and passing out into the atmosphere at the bottom, and was perfectly condensed in the flues, imparting its latent heat to the fluid in the boiler, which was rapidly converted into vapor to a pressure of 50 lbs. to the inch. This vapor was used to work an engine in place of steam, and was condensed by cooling after being used, pumped back into the boiler, and used again continuously. Only forty gallons of the bisulphide of carbon were required to fill the boiler and work the engine constantly, and the amount of fluid lost did not exceed half a gallon per day. The engine, used to work the vapor in, was of 12 inch bore and 24 inch stroke, and ran at 50 revolutions per minute. The steam engine from which the exhaust was used, was 10 inch bore and 24 inch stroke, and ran at 60 revolutions per minute. The temperature of the condensed water discharged from the flues of the bisulphide boiler did not exceed 116 degrees Fahr. at any of the trials made.

JOEL A. H. ELLIS.

100 Summer street, Boston.

### Is Psychic Force Spiritualism?

*To the Editor of the Scientific American.*

MR. CROOKES ON THE "PSYCHIC" FORCE.—It is nearly twenty-five years since the "Rochester Knockings" first drew public attention, in the United States, to this "Force." Mr. Crookes, an eminent scientist of England, has recently presumed to name it "Psychic." He has, with commendable

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hardihood, undertaken to investigate it with as little professional prejudice as possible.

It is to be hoped that he will have the independence and manliness to avow, publicly, his conclusions and convictions, even if he should come to the belief already reached by thousands and thousands of men and women, who have already investigated the subject, with as much honesty and sincerity, if not with quite as much science, as Mr. Crookes, namely: Spiritualism; the conviction, that every human being has a spiritual body and a natural body, that upon the death (so called) of the natural body, the spiritual body still lives on forever, and that this spirit does now, under certain unknown conditions, communicate with spirits yet in the natural body, and does now, by unknown laws, cause physical phenomena, unexplainable by natural laws.

The literature and traditions of every nation and tribe on earth are full of these phenomena. Founders of religions have always wisely availed themselves of these manifestations. The day is dawning, when he people will be permitted to share and understand the universality of these glorious truths of religion.

Spiritual influence is the true solution—as B. Stewart, in "Nature," candidly says: "We are not entitled to reject his testimony (that of a spiritualist) on the ground that we cannot explain what he has seen in accordance with our preconceived views of the universe, even although these views are the result of a long experience; for, by this means, we should never arrive at anything new," and no new truth could be discovered.

THOS. G. WILLIAMS.

### Euler's Bottle washing Machine.

This invention relates to an improved machine for washing bottles; and consists in the arrangement of certain holding and rotating devices in a vessel designed to contain the cleansing or rinsing liquid. Through the side of a box or vessel, open on top, of rectangular or other form, and lined with sheet metal, are fitted a suitable number of horizontal spindles, which receive rotary motion by a band, or gearing from a suitable driving shaft. Within the box or vessel each spindle is provided with a cone or plug, of such shape as to fit conveniently the cavities usually provided at the bases of bottles. These plugs may be removable, so that such of different size or shape may be applied to fit the several kinds of bottles. Plates sliding on cross bars are firmly secured within the box and are forced by springs toward the plugs. The bottles to be washed are first dipped into the water contained the box, and are thus about half filled. They are then in placed with their bases against the revolving plugs, and with their mouths against the plates, the springs holding them properly in position. The plates are perforated in line with the spindles, so that the mouths of the bottles will not be closed by them. The spindles being revolved, the bottles will also be turned by the friction of the plugs, and will be thoroughly rinsed and cleansed by the water within and without. The boxes may be arranged in pairs, side by side, so that both ends of every spindle are utilized. A fresh water reservoir, supported above the box on a frame, has a discharge faucet within which is placed a valve, held on its seat by a spring. From the valve is suspended, through the discharge opening of the faucet, a crooked wire or rod, by which the valve is opened.

Each bottle, after having been rinsed as above described is held against the wire, so as to raise the valve and thereby open the faucet, letting clean water flow directly into the bottle below, to complete the cleansing process The spring will close the valve immediately after the withdrawal of the bottle from contact with the wire. Conrad Euler, of Evansville, Ind., is the inventor of this machine.

### Fertilizers from Sea Weeds.

Mr. Upham S. Treat, of Eastport, Me., has invented the following process for making fertilizers from sea weeds, upon which he has obtained a patent. The sea weed is subjected to the action of steam under pressure until it is reduced to a pulp. It is then passed through a mill, where it is thoroughly mixed with ten per cent, more or less, of finely powdered quicklime. After being thus mixed, it is elevated or placed in some suitable place to be thoroughly aired and dried, when it is ready for packing in barrels and for market.

Upon the Atlantic coast, sea weed is a most abundant article, used at present to some extent as a fertilizer, in combination with barnyard and other manure; but its valuable qualities seem to be dissipated and in a great measure lost, by exposure to the atmosphere in its crude state, or from not securing proper chemical treatment. By Mr. Treat's process, it is claimed, all its native richness is preserved, and a hitherto almost useless weed is converted into an efficient compound for enriching the soil.

### Volcanic Disturbances in the East.

The news of most terrible earthquake shocks and volcanic disturbances comes to us from the Philippine Islands. In the small island named Camiguin, near to Misamis, for some months past a succession of most violent earthquakes has been experienced, causing crevices, etc., in the open country. On the 1st of May, about five o'clock in the evening, the earth burst asunder, and an opening was formed 1,500 feet long. Smoke and ashes, earth and stones, were thrown up and covered the ground far and near. At about seven o'clock, as darkness was coming on, this crater burst into activity with a loud explosion, followed by a shower of lava and ashes. About 150 persons were destroyed. The eruption of the new volcano has since been so tremendous that the inhabitants have forsaken the island, and of the 26,000 previously there, not 300 are left. Camiguin is only about thirty-six miles in circumference, and was very productive in abacá (the Manilla hemp) yielding annually from 30,000 to 40,000 piculs, or more than a tenth of the produce of the world. There is little hope of the island ever being again re-occupied or cultivated.

### TRADE MARK REGISTRATIONS.---INTERESTING DECISION BY THE HON. M. D. LEGGETT, COMMISSIONER OF PATENTS.

In the matter of the application of the Dutcher Temple Company for registry of trade mark—Appeal.

The applicant seeks to have registered as a trade mark the "letter D encompassed by the figure of a lozenge."

This device is placed upon "loom temples" manufactured by the applicants.

The examiner rejects the application on the ground that the proposed trade mark has no feature that indicates "origin or ownership."

The examiner's doctrine on the subject seems to be that every trade mark must include either the name of its proprietor, or his place of business, or both.

The object of a trade mark is to distinguish the goods of one manufacturer or merchant from those of another in the market. The only benefit the proprietor of a trade mark can hope to derive from it, is that such mark may point out the goods, upon which it is found, as coming from him, and thereby bring customers back to him when desiring to make additional purchases. This being the only object a dealer can have in adopting a trade mark, he may generally be trusted to see that it be known where the goods come from, on which the trade mark is placed.

The origin of goods may be determined in many ways, provided they have upon them some mark by which they may be distinguished in the market from other similar goods. The name of the manufacturer or the name of his place of business are evidently not the only means of determining the origin of marked goods.

In the case of *Filling vs. Fassell* (reported in Vol. 8, Am. Law Reg., p 402) tried in the Superior Court of Missouri, the judge says: "The books are full of authority establishing the proposition that any device, name, symbol, or other thing may be employed as a trade mark which is adapted to accomplish the object proposed by it, that is, to point out the true source and origin of the goods to which said mark is applied." On the strength of such authority, decision was given in favor of the plaintiff sustaining the words "Charter Oak," accompanied by a figure of an oak tree, cast upon the plates of stoves, as a legal trade mark. In these words and device the court, it seems, found enough to indicate "origin or ownership." With such a mark permanently attached to the stoves, they were readily identified in the market, and of course could easily be traced to their origin. The fact of the mark opened and pointed the way to the factory where the article was made. It was the owner's "ear mark," which he placed upon all his goods of the kind, and by which the public come to know the stoves were made by him.

There are many other decisions recognizing the fact that mere symbols or devices or unmeaning words may, by continued use, indicate origin, and thereby become legal trade marks.

A careful reading of the decisions will show that the courts have held with very great unanimity that the person's name or place are neither absolutely essential to the validity of a trade mark. If it possesses the evidence upon its face that it is put forth or given out as a distinguishing mark of the goods to which it is attached, that is, distinguishing as to origin and not as to kind or quality, it may have all the requisites of a valid trade mark without naming the person or place whence it came. The very fact that it bears evidence of being the manufacturer's or dealer's private mark, by means of which his goods are distinguished in the market, is sufficient indication of origin to warn against copying by competing dealers, and this answers the public demand.

At common law, the trade mark to become legal and to vest an exclusive right in the persons adopting it, must have been so long in use as to be known and recognized in the market. That is, a person could not adopt a trade mark to day and successfully sue for infringement of it tomorrow. Whether the office should demand that a trade mark should have such use before admitting it to registry, has been a question with the examiner; but I am of the opinion that one object of the registry law was to settle this very question. *Registry* is notice to the world, and supplies the place of *long use* at common law.

The applicant's device is not a genuine name, it is not indicative of quality. It does not consist of words or devices that others in the same trade would be likely to select for a similar purpose, and I see no valid reason against admitting it to registry.

The decision of the examiner is reversed.

(Signed,) M. D. LEGGETT, Commissioner.

Sept. 21, 1871.

### WHAT CONSTITUTES PATENTABILITY IN AN ARTICLE OF MANUFACTURE.---IMPORTANT DECISION BY THE COMMISSIONER OF PATENTS.

In the matter of the application of Charles A. Moore, for letters patent for improvement in clock cases. Appeal from Examiners in Chief :

The applicant seeks a patent on what he claims to be a new article of manufacture, consisting of a pressed glass clock case, constructed with the entire front, sides, top, and bottom in one piece, the front being adapted for the face and hands of the clock, and the whole ornamental in design, and cheaply manufactured.

He is met by references to glass boxes, vessels, preserve dishes, porcelain ware, pressed clock fronts, clock covers, etc., etc., and also to clock cases made of porcelain and earthen ware.

The only question now to be decided, is the pertinency of these references.

It is very difficult to establish any rule as to references that shall be plain and of universal application, consequently there are almost as many different rules of practice, in finding references and making rejections, as there are different examiners in the office.

Some examiners are very quick to detect resemblance, and will reject almost everything. Others are equally quick at finding differences, and will grant patents on mere shades of variation. Hence a picket fence is rejected on reference to a comb; a urinal, on reference to a blacksmith's furnace; a surgical instrument for injecting spray into the throat or nasal organs, on reference to a fireman's hose; a rubber packing for fruit jars, on reference to a pump; a device for lacing ladies' shoes without the use of holes or eyelets, on reference to an old mode of cording bedsteads; an ore crusher, on reference to a nut cracker.

In each of these cases there will be found a remote resemblance between the device in the application and the reference. In some of them, however, the examiners have displayed more inventive genius in finding the references, than the applicants would dare claim for their devices.

As before stated, the impossibility of prescribing definite rules of general application as to the pertinency of references, has given rise to a great want of uniformity in the office practice.

It is proper, however, to say that references should be limited to things of a kindred nature—to things so nearly related in adaptation and use, as that seeing one, would naturally suggest the other. There should be some analogy between the use and result of the device in question, and the reference upon which it is rejected. The analogy should be so close that the device would likely be suggested to a person skilled in the art to which the device relates, by seeing the thing used as a reference. Unless there be such analogy, the reference could hardly be regarded as pertinent, even in applications for machine patents.

But in regard to applications for patents on manufactured articles, the field of reference is still further limited. The only questions to be settled are:

1. Is the device of itself an article of trade?
2. Is it useful?
3. Is it so different, in essential points, from other articles of the class to which it belongs, as to be easily distinguished in the market?

These being answered in the affirmative, a patent should be allowed. Try the case in hand by this rule.

1. The device is intended as an article of trade, not as a clock, but as a clock case; intended to be put upon the market simply as a clock case, and sold to clock makers.

2. It is more cheaply made than any other transparent clock case, and equally ornamental; hence it is useful. "The beauty of an ornament is one great test of its utility," says the learned judge in the celebrated *Magic Ruffle* case. (2 Fish, 336.)

3. There certainly would be no difficulty in distinguishing the clock case in question in the market, from any of the references, as an article of manufacture; it is essentially ifferent from preserve dishes, tumblers, ordinary glass boxes, pressed glass clock fronts, or glass clock covers. It belongs entirely to another family of articles. Neither could it ever be mistaken for porcelain or earthen ware clock cases of the same family. The results sought in this clock case are cheapness, ornamental form, and the special quality of displaying the internal machinery of the clock, without exposure to dust or the use of a cumbersome cover.

This last quality is not possessed by either porcelain or earthen ware.

I do not recognize any pertinency in any of the references.

The decision of the Board of Examiners in Chief is therefore reversed.

(Signed,) M. D. LEGGETT, Commissioner.

United States Patent Office, Sept. 23, 1871.

### EXTENSION OF CENTERING MACHINE PATENT.

In the matter of the application of E. F. Whiton for the extension of letters patent, bearing date July 14, 1857, for a Centering Machine.

DUNCAN, Acting Commissioner:

The following is the substance of the examiner's report:

The machine or device described in the patent is intended mainly for centering and marking the centers of shafting.

On examination, the invention is found to have been new at the time the patent was granted, and it is found also to be useful and important.

In proof of the fact last stated, a number of affidavits have been presented, all of which certify to the superior utility of the invention, but these affidavits, as well as applicant's statement, are entirely silent as to the value of the invention to the public. Perhaps, however, this omission was unavoidable, considering the fact that the thing invented is not a machine for *creating* or *producing*, but rather a convenient tool or adjunct, the purpose of which is, and can be, only simply *directive*.

It would seem from the statement in the case and otherwise, that at the time of making the invention the patentee was a laboring mechanic, and possessed of but little means; that by the assistance of a brother he was enabled to commence the manufacture of his improved device, but that for several years his business was characterized by losses instead of gains, these losses resulting from inadequate machinery for the manufacture of his device, and the want of means to procure better; and also from the imperfect construction of the device itself, which rendered those first made unsalable.

Applicant expresses the opinion that had he possessed the necessary means, he might have made and sold at least five hundred of his centering devices annually; as it is however, he has made and sold but seven hundred and fifty one.

The statement of receipts and expenditures is as follows:

| | | |
|---|---|---|
| PATENT, DR. | | |
| To cash received for 751 centering machines | | $35,888 |
| PATENT, CR. | | |
| By cost of manufacturing 751 centering machines | $32,702 | |
| Procurement of patent | 175 | |
| | | 32,877 |
| Excess of receipts over expenditures | | 3,011 |

It is not deemed essential, under the provision of the statute which requires the applicant for an extension to make statement of the ascertained value of his invention, that this statement should be given in dollars and cents. Doubtless it was only contemplated, by the provision referred to, that the applicant should furnish the necessary data to enable the Commissioner to form an intelligent judgment as to the merits of the invention. (See case of Peter Cook, Commissioner's Decisions, 1870, 24.

In the present case it appears that seven hundred and fifty machines have been sold, and the testimony is emphatic as to the satisfactory character of their operation.

The patentee's diligence in the introduction of his invention is of the most commendable character; and the small profit realized appears to be an entirely inadequate remuneration for the time, ingenuity, and expense bestowed upon it. The patent will be extended.

DRAINING LAND.—A strong metal pipe, about 20 feet in length and 6 inches in diameter, is adjusted in a slanting position over the lot to be drained. To an opening in the bottom of this pipe, another is firmly jointed, inclining backwards at an angle sufficient to allow of its end resting on the ground lot. Connected with the principal pipe, is a strong canvas hose, down which a current of water descends, and issues at the mouth of the pipe. In its course, it forms a vacuum in the second pipe, and the water is thus sucked up and discharged with the current flowing through the principal pipe. This device is in use, for the purpose described, in Australia, but is known to most men practically acquainted with hydraulics.

DRESSING ROLLED IRON.—Ah improvement in dressing the scale off finished iron bars in rolling mills is in use at the extensive works of Griswold & Co., Troy, N. Y. It consists of a wire brush fastened on a bar fixed on the discharging side of the rolls, and is said to be a great improvement of the friction with cinders usually applied for the purpose.

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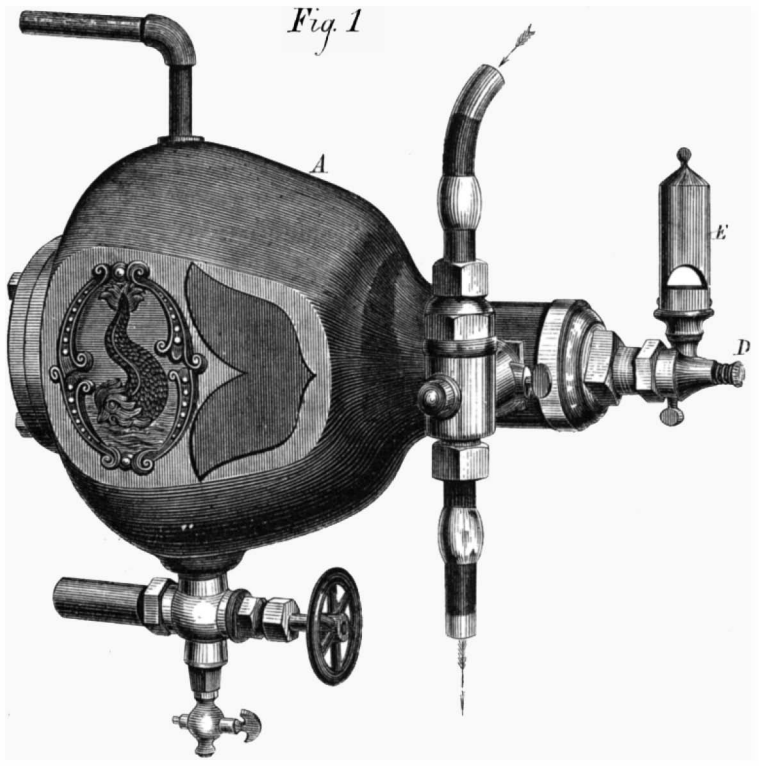
### Feed Water Regulator and Low Water Alarm Combined.

We illustrate herewith an appliance for steam boilers, which we consider useful and economical on any boiler, but more especially on those in shops too small to warrant employing an engineer solely to care for the engine.

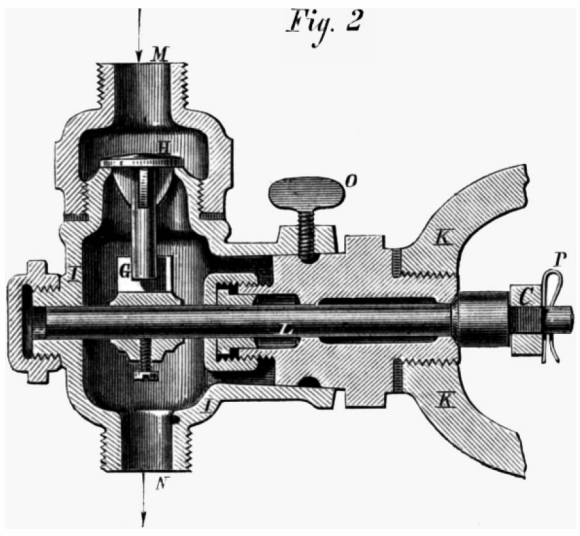
The office of the appliance, as its name indicates, is, first, to regulate the flow of water from the hydrant or tank to the pump (which is constantly running) so as to keep the water at a regular hight in the boiler—just enough constantly entering to supply the evaporation (which, doubtless, all will agree, is the best way to supply the water); and every one using small boilers knows that it is a difficult thing to accomplish, especially when power is irregularly used, requiring more or less steam, as the work demands. In the next place, should the water pipes get stopped, or the attendant forget to turn on the water, causing it to fall a few inches, an alarm will be sounded before too low water occurs. In this particular, it is like the "Reliable" low water alarm illustrated in this journal some time ago, which, we are informed, has been very successful.

In the Regulator, power is gained to perform, with the same works, the two offices, as described.

Fig. 1 is a cast iron case, A, about ten inches wide, and fifteen inches long, in which is suspended a float, which hangs by its lever on the shaft, L, which passes through the water valve case, I, a longitudinal section of which, cut transversely across the neck of A, is shown in Fig. 2. The float, as it rises or falls, turns the shaft, L, and if it fall too low, it will also, with its end extending past the shaft, tip the valve, as in the alarm above described, and sound the whistle, E. The case, A, is connected to the boiler by both steam and water pipes, so that the water in it will be on the same level as the water in the boiler. Thus the float will constantly be holding the valve, H, by the trip, G, or shaft, L, just open enough to allow water to pass as described. The hydrant pipe is connected at M, and N is the




LYNDE'S FEED REGULATOR AND LOW WATER ALARM.




passage to the pump. K shows a section of the neck of the iron case, A, when I is screwed in. This instrument is also arranged to turn on steam to pumps, if desired to feed by them, or it will start and stop a power pump, if desired to feed in that way; but it is shown in the manner believed to be the best and most economical way to feed, and in which it is the most useful.

This appliance is now on exhibition at the American Institute Fair in this city, and further information may be obtained by addressing the patentee and manufacturer, J. D. Lynde, at 405 North Eighth street, Philadelphia, Pa.

### Improved Curb Roof.

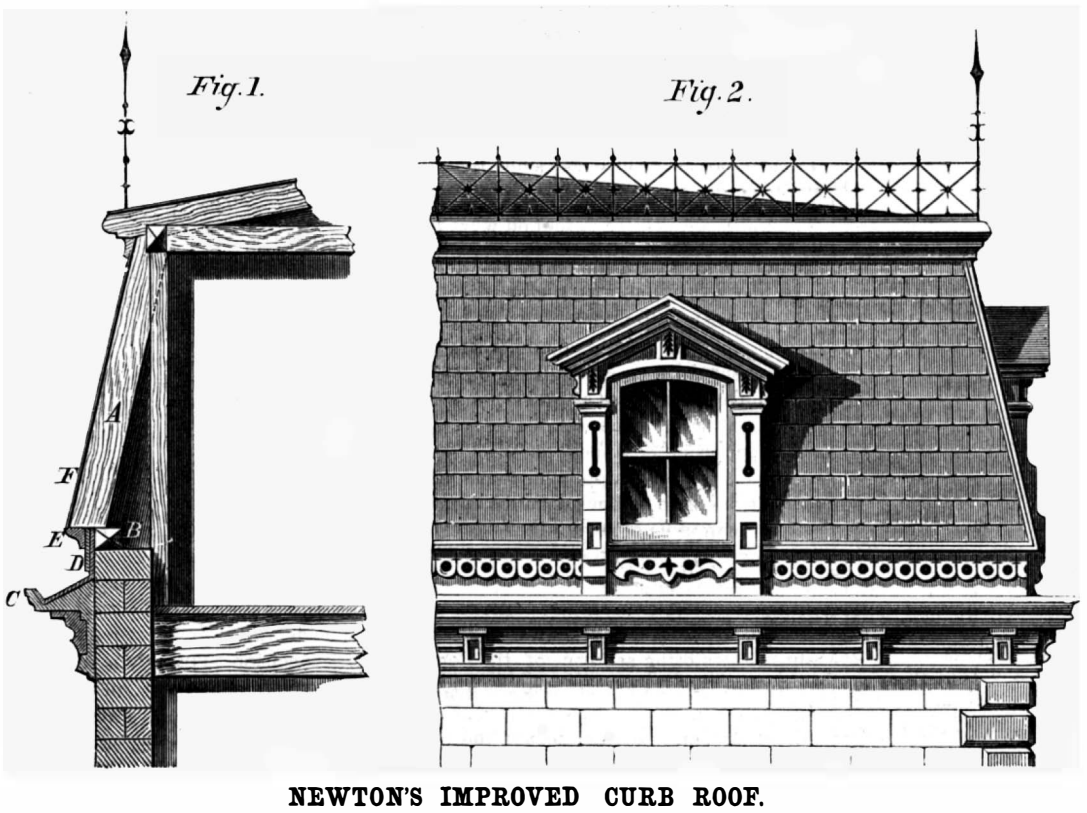
Among the patents issued for the week ending Aug. 22, 1871, was one to Mr. Dudley Newton, architect, of Newport, R. I., for an improvement in the curb or mansard roof.

The improvement lies in the introduction of an ornamental fascia and bedmold, above the cornice and below the slate or shingles, so arranged as to allow water to drip clear of it into the gutter; said gutter being built in the main cornice at a sufficient distance below to allow this ornamental work to appear to advantage from the ground.

Referring to the engravings, Fig. 1 represents a section of roof. A is the rafter, the foot of which projects over the plate, B. C is the cornice, in which is built the gutter, the metallic lining of which extends nearly to the top of the plate, B. D is a fascia—plain or ornamental, put on outside of the extended lining of the gutter. E is a bedmold covering the ends of the rafters. F is slates or shingles running over the edge of the bedmold, E. Fig. 2 shows a portion of one of these roofs with dormer window.

It will be seen from the foregoing that a separate line of finish is obtained above the main cornice, making a break between it and the slate, and correcting its shelf like appearance, so often complained of, and thereby greatly adding to the architectural effect. It gives a perfect gutter, easy to get at and keep in order, and is less liable to leak than any other. It admits of placing the dormer windows in the most favorable positions as regards hight from the floors in the rooms, and greatly improves their exterior effect.

Wishing to benefit the profession at large, Mr. Newton offers the rights to use this roof, to architects throughout the country on very moderate terms, but will in no case sell such rights to builders. Parties wishing further information may address him for circulars




NEWTON'S IMPROVED CURB ROOF.

### Improvement in Slat Mattings for Car Floors, etc.

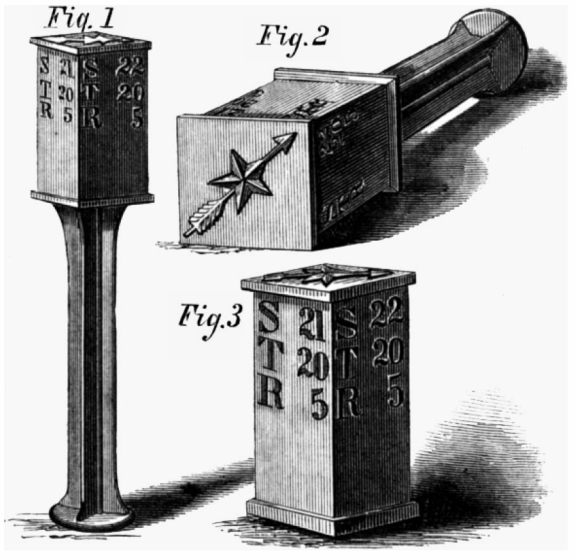
This invention has for its object to furnish an improved slat matting for car floors, saloon floors, and other places, which shall be so constructed as not to be injured or broken by the expansion of the wooden slats, and not to be made loose and shaky by the contraction of said slats consequent upon change of temperature or dampness. It consists in the combination of rubber washers or buttons with the wooden slats and connecting rods of the matting. The wooden slats of the matting are strung upon rods in the ordinary manner. Rubber washers or buttons, in the form of short tubes, are placed upon the rods between the slats. The ends of the rods are secured at the outer sides of the outer slats by having heads formed upon them, or by nuts or other convenient means, metallic washers being used, if desired. By this construction, should the wooden slats expand or swell, the rubber will be compressed, and the slats and rods will be prevented from being broken. The rubbers are somewhat compressed when the matting is being made, so that, should the slats shrink or contract, the rubbers will expand, and thus hold all the slats securely in their proper relative positions. Should any one of the slats be accidentally broken, the expansion of the rubber blocks or washers will take up the space, and thus keep the other slats securely in their places, and prevent all play or rattling of said slats, which is unavoidable when wooden or other unyielding washers are used. This construction also enables the wooden slats to be made narrow, to present the smallest possible space to receive dirt, and thin washers to be used, thus making the matting with narrow spaces between the slats, giving it a neat and light appearance while having the requisite strength. Samuel Lewis, of Williamsburgh, N. Y., is the inventor of this improvement.

### PARISH'S IMPROVED LAND MARK.

The destruction of land marks often leads to misunderstandings, and even litigation. In a matter so important, especially in new countries, where these indications are the only guides to settlers, it is essential that land marks should not only be durable, but that their inscriptions should be so clear a guide as to be unmistakable.

Monuments, or landmarks of stone, are liable to be broken off, or to crumble from the effects of frost. If any inscription is painted upon them, it is in time effaced by atmospheric influences; and to carve inscriptions in stone is an expensive operation.

The object of the present invention is to obviate all these difficulties and objections by the use of cast iron land marks, of a special design, as shown, having the proper inscriptions cast upon them, such land marks, it is claimed, being cheaper, while far more efficient and durable than any that can take their place. The design is so clearly indicated in the engraving that it need not be described in detail. Three of the land marks are shown, one lying loosely upon the ground, one standing loosely, and a third being inserted in the ground, as in actual use.




The part entering the ground is long, and, being ribbed quadrilaterally, is very strong. The arrow upon the top indicates the meridian, and the inscription gives the numbers of section and township, and the range of the exact position where the land mark is placed.

Design patented January 3, 1871, by John H. Parish. For further information address George Peacock, Talladega, Ala.

### Consumption and Climate.

THE following sensible advice is the closing paragraph of an elaborate article on consumption and climate by Dr. Hall: "We have long considered it one of the inhumanities of man to man, in so glibly advising persons to go from home to distant places, involving, many times, ruinous expenses, especially when it is given as a last resort—advice often given when everything possible has been done and tried without efficacy, merely on the ground that possibly it might make some change for the better, while the overshadowing probabilities are that death will be the result anyhow. Any man who is considered by an intelligent physician to have actual consumption, ought by all means to stay at home."

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## LABOR IN ENGLAND, AND THE INTERNATIONAL WORKING MEN'S ASSOCIATION.

Those who have believed the International Working Mens' Association of small account in its influence upon industrial affairs throughout the world, may learn a useful lesson from the recent struggle between labor and capital in England, in which, at present writing, the former has every prospect of victory. There has been, in this country as well as in England, general blindness to the significance of this organization; its leaders have been stigmatized as wanting in sagacity, and its members as rabble. That it has brains to organize, and resources not to be ridiculed, has been proved on more than one occasion.

It is worse than useless to shut our eyes to facts which we shall ere long be called to face, and which must inevitably produce changes in the distribution and rewards of industry, scarcely to be imagined, much less predicted. The working classes of different nations throughout the civilized world have, by modern advances in civilization, been put into a kind of intercommunication that fifty years since would have been impossible. Steam travel, the telegraph, and cheap printing, have given them knowledge of each other's condition in all parts of the world. National and international exhibitions of the products of industry have familiarized them with national peculiarities of handicraft, and although the majority of them—especially in Europe—are still ignorant, there have sprung from their ranks those who have shown qualifications for leadership, and who have effected an association out of materials which, though perhaps the most heterogeneous ever yet known in any organization, yet hold together by a universal feeling of brotherhood, having almost the cementing force of a religion.

Already has one civil war been born of the struggle between this power and capital. Yet the Paris Commune was only one division of the International. To-day an army of workmen in England are, and have been for months, supported without work by contributions from subordinate branches of the International, in a struggle for a reduction of hours of labor without decrease of wages. As we have said, it seems now that their demands must ultimately be complied with.

A brief history of this movement may not be uninteresting in this connection.

About four months since, a demand was made by the workmen, in the workshops on the Tyne, for a reduction of one hour's labor per day without a corresponding reduction in their pay. The demand was refused; and, about the first of June, the workmen, numbering some ten thousand, struck. The Trades' Unions in England immediately contributed fifty cents per week to each striker. Next, the movement was approved by the General Trades' Council, in London, and other trades' unions, and the allowance was doubled. Some of the strikers, having savings, refused assistance, and so the allowance has gradually been increased to two dollars per week for such as accept it.

A significant feature of this strike is the united attempt made by the prominent engineering firms in England to defeat it. These sided with the Tyne firms, and raised a large fund for the purpose of importing workmen from other parts of Europe. But in making this attempt, they came in contact with the International Working Mens' Association, the General Council of which sent agents to Belgium and Denmark to warn workmen against yielding to the solicitations of the English manufacturers. Notwithstanding this, a large number of workmen were obtained from Belgium, and others were secured from the Government Arsenal in Denmark. There were also some Germans and Norwegians induced to go to England through the activity of the agents despatched to their respective nationalities.

But the influence of the International, coupled with the threats and remonstrances of the English workmen, soon overpowered that of the manufacturers, and all but the Norwegians have been sent back to their homes at the expense of the strikers. The Norwegians, numbering less than one hundred and fifty, held out, and still remain in England.

At times, there have been fears that the strike for reduction of hours would become general throughout England, and great efforts have been made on the part of the Tyne workmen to bring about such a movement. But, although they have failed in this, the powerful union to which they belong, extending to both sides of the Atlantic, seems resolved not to let them be worsted in this contest.

We have thus the spectacle of united capital pitted against united labor, on a scale to test the relative strength of each. By those who make political economy a study, and who read carefully the signs of the times, this is seen to be one of many such contests yet to follow, some of them perhaps not bloodless, as this has yet been, but all of the gravest importance to the future welfare of society.

Prone as is the American public to refrain from recognizing and preparing for approaching emergencies, there are among us some, who see that the adjustment of the relations of capital to labor, will soon force itself upon public attention, in a manner which will admit of no temporizing. To such, the struggle now progressing in England possesses features of unusual interest; and its result will be looked upon, by the unions at least, as establishing a precedent for the future.

On the evening of September 23rd, the officers of the recent eight hour demonstration in this city held a meeting, in which it was resolved to organize the building trades into a grand "Building League," and it was further announced that a great strike is arranged to take place next April, which will include the whole of the United States and Canada. How much of this is vain boast, intended to intimidate employers, and to secure present concessions, time will show; but that trouble is brewing is plain enough.

## IMPORTANT DECISIONS BY THE COMMISSIONER OF PATENTS.

We give place, in our present number, to two decisions by the Commissioner of Patents, which, in the liberality of their views and the emphasis given to the principles announced, are calculated to have an important influence in promoting the useful purposes of the patent laws.

The first of these decisions pertains to the question of the patentable novelty of new and improved articles of manufacture. On this subject, the Commissioner's logic is quite interesting, and in the course of his remarks he imparts wholesome light for the minds of his subordinates, the examiners in chief and the primary examiners.

In the particular case before him the invention sought to be patented was a transparent glass clock frame, an entirely new, useful, and elegant article of manufacture, in regard to the patentability of which no person of intelligence, except an examiner in the Patent Office, could have any doubts.

Over this simple case, which ought to have been decided in favor of the applicant in ten minutes, the primary examiner racked his brains and ransacked the Patent Office for references, and finally, after a number of days useless delay, made a solemn official decision, rejecting the case.

The applicant was then obliged to go to the trouble of arguing the matter before the primary examiner, upon a rehearing. After further examination and further searches, conducted on the usual red tape plan, the examiner rendered a second adverse decision.

The applicant was now subjected to the payment of a new official fee, in order that he might have his case reviewed by the Board of Examiners in Chief.

This Board consists of three able gentlemen, qualified by their knowledge of science and the patent laws, and especially appointed to correct the mistakes of the primary examiners.

In due form, after the usual delay, the case came up before this Board for hearing, when the applicant showed that his invention was a new and useful improvement, and that he was clearly entitled to a patent. But the Board of Examiners were unable to see it, and after due deliberation they came to the conclusion that the decision of the primary examiner was correct, and that in view of the fact that preserve dishes, tumblers, etc., are made of glass, and are transparent, there could be no patentable novelty in making transparent clock cases of glass.

So the applicant was again rejected, and compelled, in order to get the decision set aside, to go through the delays and expenses of an appeal to the Commissioner of Patents in person, in whom, happily, he found an individual possessed of common sense, and not afraid to use it.

The Commissioner reviewed the case, and quickly disposed of it, reversing the previous decisions, and ordering a patent to be issued.

The worthlessness of the decisions of the primary examiner and of the examiners in chief in this case is made apparent in the closing sentence of the Commissioner's decision, where he says: "*I do not recognize any pertinency in any of the references.*"

In other parts of this *dictum*, the Commissioner exposes, without any compunctions, the absurdity of some other Patent Office decisions; such, for example, as the rejection of improved picket fences upon references to combs; and of improved urinals on references to blacksmiths furnaces.

He lays it down as the governing rule of the Patent Office that patents are to be issued, not only for chemical and mechanical inventions, but also for all kinds of *improved articles of manufacture*, and that the examiners, in searching for references, *cannot legitimately go outside of the particular class of articles to which the alleged improvement belongs.*

It is evident that the Commissioner seeks to make a new departure for the Patent Office, and that in the future he desires the examiners to give a more broad and liberal interpretation of the law, in favor of the applicant. In this he will be fully sustained by the public, and his present decision will give very general satisfaction.

### Patent Office Examinations.

We have for some time inclined to the opinion that our system of official preliminary examinations was a failure, productive of more trouble to inventors than benefit; and the present decision of the Commissioner tends to corroborate this view. We particularly commend it to the study of our English friends who have fallen so desperately in love with our system that they are anxious to engraft it on the British statutes.

"It is very difficult," says the Commissioner, "to establish any rule as to references that shall be plain and of universal application; consequently there are almost as many different rules of practice in finding references and making rejections as there are different examiners in the office."

"The impossibility of prescribing definite rules of general application as to the pertinency of references, has given rise to a great want of uniformity in the office practice."

"The examiners have displayed more inventive genius in finding the references than the applicants would dare claim for their devices."

Such is the practical working of the system of official preliminary examinations, after thirty-five years' experience therewith at Washington, as presented in this decision of Commissioner Leggett, who, as all will admit, is one of the most able and intelligent officers that have ever filled the Commissioner's chair.

We are pretty well satisfied that the law ought to be amended, making it the duty of examiners simply to see that the patent papers are correct in form, and if so, then promptly to issue the patent. But a necessary condition of this change will be the publication of all existing patents, in a cheap and popular form, so that applicants may readily make their own examinations as to novelty, and judge for themselves as to the propriety of taking out a patent. The question of the validity of a patent rests, after all, with the courts for decision, and it matters but little what the Patent Office examiner thinks about it.

The second decision of the Commissioner relates to trade marks, and is referred to in another paragraph.

## TRADE MARK REGISTRATIONS.

To a considerable extent the Congressional laws for the registration of trade marks, passed last year, have been nullified by the conceit of the officials, to whom the business of registration is committed at the Patent Office. The matter of registration might be readily done by a smart person in half an hour's time; but as now conducted it is a long and serious operation.

In some cases, the examiner appears to spend days in considering whether or not the words sought to be registered are new words, or in deciding whether registration shall be granted without a device, or whether the applicant shall be required to append a device to the words of his trade mark; or whether he shall be required to add his name and address, whether a symbol only may be registered, whether a letter only may form a trade mark, and so on *ad infinitum*. The examiner, in fact, expends far more ingenuity in concocting excuses for refusing registration than the applicant exhibits in devising the trade mark itself. But what is an examiner good for, except to make trouble and delays for the applicant?

All these questions are conclusively answered in the able and interesting decision by Commissioner Leggett, relative to trade mark registrations, which we elsewhere publish. From this document, the examiner will learn that *any device, name, symbol, or other thing*, may be legitimately employed as a trade mark, and as such may receive registration.

In view of this decision, it is to be hoped that the officials will in future higgle less over the small points, and use more common sense coupled with diligence in granting certificates of registration. The law was made for the express purpose of protecting manufacturers and merchants in the symbol or design they have devised for a trade mark; and it ought to be the sole aim of the examiner to grant the registration, except in those cases that are positively and unqualifiedly forbidden by the law.

## CHEMICAL MANURES.

The constituents of a fertilizer, which give it its invaluable, properties are known to be elements which originate only in animal and vegetable life. But the countless generations of beasts, birds, and fishes which have inhabited this planet in prehistoric times have not passed away without leaving behind them somewhat for the benefit of mankind. Wherever, on or under the earth, the sea has been, (and where has it not?) there are to be found the remains of organic existences; and, as would naturally be supposed, the fish tribe furnishes the greater part of these specimens, and deposits of their remains, either as fossils, or intermixed with the substances of rocks, are found everywhere. And many of these beds conserve so much of the valuable properties of the fish, that

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they are largely used as manure. Rocks, more or less phosphatic, exist in most countries, and readily yield their prosphorus to increase and perfect the growth of our cereal crops. Phosphate of lime is the usual combination of which these deposits are formed; and this mineral needs treatment with sulphuric acid, which eliminates some of the lime, and consequently increases the per centage of phosphorus, and makes its liberation, when the compound is subjected to the decomposing effect of the soil, more certain and more plentiful.

This product is superphosphate of lime, and its manufacture is becoming a most important industry in many parts of the United States. In the neighborhood of Charleston, S. C., there is a bed of phosphate, extending for miles in length, at a depth of only six feet from the surface. It is full of fossils, and is thoroughly impregnated with phosphorus. The bones of extinct animals, of nearly every species found in the secondary formations, have been discovered there, as well as of sheep, hogs, dogs, horses and other cotemporaries of the human race. Bones of man, flint hatchets, and other mute witnesses of the existence of mankind in ages long passed away, have been observed by investigators of this stratum.

This immense and valuable phosphatic deposit is now being worked on a very large scale, fifteen companies being engaged in producing fertilizers by the treatment above described, varied more or less by circumstances. The product of this manufacture is 1,000 tuns of superphosphate of lime per day, and is being mostly shipped to England. The *South*, a new venture on the waters of New York journalism, states that the capital employed in the trade is over $2,000,000, and that one company has a contract to deliver 200,000 tuns. It is to such enterprises as these that our farmers of the Eastern States must look for means of improving their impoverished lands.

## THE ETHER CONTROVERSY.

By no event is the difficulty of writing contemporaneous history better illustrated than in the controversy that has arisen in reference to the discovery of the anæsthetic properties of ether. Although some of the chief actors in the scene and many of the witnesses are still living, it seems to be impossible to obtain concordant testimony in reference to the real originator of the application of ether, that has brought such blessing to mankind. Acrimonious controversy, passionate personality, professional hostility, dogged obstinacy, have taken the place of calm judgment and impartial investigation; and thus it has been brought about that no two writers agree in their account of the important discovery. We do not care to let loose the dogs of war and revive the bitter contest, but in our capacity as journalists, it comes in our way to allude to two pamphlets on the vexed question which have recently been sent to us. One of them is a reprint of the report of the late Edward Stanly, of North Carolina, presented to the House of Representatives of the United States, on the 28th of August, 1852, from the select committee on the ether discovery, strongly controverting the claim of Mr. W. T. G. Morton to any appropriation of money as a reward for his alleged discovery; and the other is in the form of "Historical Memoranda relative to the discovery of etherization, and to the connection with it of the late Dr. Wm. T. G. Morton, prepared by a committee of citizens of Boston chosen to raise a "Morton memorial fund." There is something in the latter pamphlet to appeal to the sympathies of the public and to silence all bitter feeling: and whatever may be the precise fact of who was the original inventor and revealer of anæsthetic inhalation, Dr. Morton's connection with it was, beyond a doubt, sufficiently important to entitle his family to a full and substantial recognition. And it would be a disgrace to our civilization if this part of the claim were not recognized; but, when we admit all this, it does not necessarily follow that there are not others whose share in the discovery was not closer, and whose claim to recognition is not greater than was Dr. Morton's. The mistake in the pamphlets appears to be the strong partisan bias in which they are prepared. The one is Jackson or nothing, and the other is Morton or nothing. Neither admits of any halfway argument, and to the unprejudiced reader, both greatly damage their cause. We have been reading the pamphlets with interest because it is really important to know to whom the world is indebted for one of the most important blessings that was ever conferred upon it; and by reading between the lines of the two productions, we arrive at a history which runs very much as follows:

Dr. Charles T. Jackson, of Boston, is a thoroughly educated chemist; Dr. W. T. G. Morton, late of Boston, was just the opposite, having enjoyed few opportunities, and being in fact an ignorant man. Dr. Jackson was familiar with the properties of sulphuric ether, had taken it to relieve pain and prescribed it to others; Dr. Morton could not have distinguished sulphuric ether from sulphuric acid. He was casting about for something to administer to a nervous woman in a dental operation, and rushed over to Dr. Jackson's laboratory to borrow a bag to be filled with air, intending to act upon the imagination of the patient, and lead her to think that she had really taken something to relieve pain. Dr. Jackson scouted the idea of practicing such an imposition, and advised Morton to administer sulphuric ether. "What is that?" asked Morton; "is it a gas or a liquid?" He was informed on these points, tried the experiment, fortunately succeeded, procured some more ether, the odor of which he asked Dr. Jackson to disguise for him, took it to the Massachusetts General Hospital, without disclosing what it was, made the proposition to administer it to a patient in a capital operation, was permitted to do so on the 16th and 17th of October, 1846; fortunately for mankind no fatal result occurred, *and the application was complete.* The attending physicians took a great risk in administering an unknown substance, and by their skill and careful handling of the case are entitled to great credit. They make no claim to the discovery, as they used what was handed to them without question. If Dr. Morton had been thoroughly honest and candid in the matter, he would have aid that he received the bottle from Dr. Jackson, and it is a question whether the attending physicians were not guilty of a want of professional courtesy in withholding from Dr. Jackson the cred't that belonged to him, knowing as they did, either at the time or immediately afterwards, that the suggestion and the science came from him. It looks at this distance of time as if there were some personal hostility or jealousy at the bottom of such reticence, but the eminence of the gentlemen in question precludes such an interpretation, and we cannot attempt an explanation. Dr. Morton at once scented a fortune in the new application of ether, and conscious that Dr. Jackson was the true discoverer within the meaning of the law, he proposed that a joint patent should be taken out. To this Dr. Jackson objected, as he was opposed to restricting the use of ether in any way, and he could not see what claim Dr. Morton could set up to join with him as an original discoverer. From that moment Dr. Morton determined to set up his own tabernacle, and to run off with all the glory and all the profit; and he succeeded in procuring a patent, and in surrounding his name with such a halo that the number of his disciples became very great, including the names, as we see from one of the pamphlets, of some of the most eminent physicians in the country. He certainly established the fame of ether by the noise he made about it, and, from this point of view, was entitled to pecuniary reward. To Dr. Jackson the world owes the discovery; to Dr. Morton, chiefly, the application.

## FAIR OF THE AMERICAN INSTITUTE.

A visit to this exhibition, since our last issue, took us among the pumps and steam engineering adjuncts, safety apparatus, governors, etc. Among the

PUMPS

the most decided novelty is the Compound Propeller Pump, exhibited by General H. S. Lansing, who has now on exhibition, at the Novelty. Iron Works, in this city, the large sized pumps described and illustrated on page 118, current volume of the SCIENTIFIC AMERICAN. The barrel of the pump shown at the fair is of glass, and, the water being colored, its motion through the pump, as acted upon by the propellers, is very prettily shown. We notice that a change has been made in the position of the rests, intermediate between the screw propellers, the former being brought down close to the latter, instead of standing midway between the propellers, as shown in the illustrated article referred to above, which change, we were informed, gives a better result.

A. S. Cameron & Co., foot of East 23rd street, New York, show a collection of beautiful steam pumps, of their manufacture, the most important being the "Special" steam pump, and a large vacuum pump, for sugar refineries, etc. The finish of these is very fine, and they make a very creditable display. Their peculiar features are well known to the engineering public.

Waring & Parke, 133 Center street, New York, show the well known "Earle" steam pumps, and Waring's Air Compressor.

The Woodward Steam Pump Manufacturing Co., 76, 78, and 80 Center street, make the usual display of their well known steam pump, including the Safety Steam Pump and Fire Engine.

Charles B. Hardick, of the Niagara Steam Pump Works, 23 Adams street, Brooklyn, shows various sizes of the Niagara Steam Pump," of fine finish, and well known for their simplicity, reliability, and efficiency.

The Automatic Steam Vacuum Pump Manufacturing Company exhibit one of their Steam Vacuum Pumps, which first made its appearance at last year's fair. This pump is unique in its construction and operation. A large chamber having been filled with steam, is suddenly emptied by the condensation of the steam. Water rises to fill the vacuum. Steam is then admitted to the chamber over the water, and the latter, being held from retreating by a check valve, is forced out of the chamber to any hight of column which the steam will equilibrate. The steam is prevented from condensation, by its contact with the water in the chamber, by a stratum of air, which being heavier than the steam lies upon the top of the water like a piston. On condensing the steam, water again flows into the chamber by atmospheric pressure, and so on, the condensation being effected by a very simple automatic injecting apparatus, and the admission of steam being performed by automatic valve gear.

Wright's Bucket Plunger Steam Pump took the first premium at the fair of last year, and is this year again exhibited. It is well adapted to nearly all the purposes for which steam pumps are used. It is exhibited by the Valley Machine Company, Easthampton, Mass.

The Bridgeport Manufacturing Company, 55 Chambers street, New York, show their American Submerged Double Acting Non-Freezing Force Pumps, which have become so widely known as to render a description needless.

We notice in this department also a

WATER METER,

exhibited by the inventor, Mr. S. B. Everett, of Ansonia, Conn. It is an inch meter, and weighs only eight pounds. It is a proportional meter, leading out of the side only a very small fraction (two drams for each cubic foot) of the water delivered, measuring the drip by a triangular bucket wheel, which drives a register, and allows the drip to run to waste. Superior durability, combined with accuracy and compactness, are claimed for this meter, which attracts much attention.

We further noticed a novel wooden water pipe, which seems durable, and is certainly very cheap. A specimen, said to have been used under ground for eight years, was shown us, and gave no appearance of decay. The sections of this pipe are made in two semicylindrical pieces, the edges being joined by tongue and groove. The parts are held together by a copper wire, wound spirally, the turns being, we judge, about an inch and a half asunder. The pipe was tested in our presence, under a pressure of 120 pounds to the inch, which pressure it endured without leaking. The exterior is coated with coal tar, in which the pipe is boiled before using. In a sanitary point of view these pipes are unobjectionable, and they are much cheaper than lead. Exhibited by Moulton Brothers & Co., Johnson, Vt.

Mr. N. Hotz, 58 Greenpoint Avenue, Brooklyn, N. Y., shows a very ingenious and, we judge, valuable improvement in faucets. The principle of this faucet may be described as that of balancing the pressure of the water against a valve, so that the valve may be as easily raised under great pressure as under light pressure, the only parts that can wear being two rubber washers, which a boy may replace when necessary. The faucet, moreover, is not liable to damage from freezing. The same improvement is applied to hydrants, which, by its use, will be always operative in the coldest weather.

The Water Filter, exhibited by Parrot and McCauley, of Morristown, N. J., and described and illustrated in this journal on page 182, current volume, attracts general attention, and seems to be making a very favorable impression. We refer the reader to the article alluded to for particulars of this filter, which is worthy of more than ordinary attention.

Among the

ADJUNCTS OF STEAM ENGINEERING,

we notice Berryman's Feed Regulator for boilers. This was illustrated and described on page 223, Vol. XXIII., of the SCIENTIFIC AMERICAN, to which the reader is referred for a full description of a very ingenious and efficient device. The Berryman Manufacturing Co., whose New York Agency is at 36 Cortlandt street, New York, are the exhibitors.

Lynde's various Safety Appliances, several of which were illustrated and described on pages 148 and 149, Vol. XXI., of the SCIENTIFIC AMERICAN, and another of which appears on another page of the present issue, are well worthy the attention of steam users.

Moore's Fly Wheel Governor, shown by Dill and Moore, 149 Center street, New York, is a fly wheel, upon two straight arms of which balls slide outward, against the force of elliptical springs, by the action of centrifugal force. This governor has the advantage that it can be run in any position, inclined, vertical, or horizontal, and may be used for all classes of engines, marine, stationary, or portable.

The Huntoon Governor is also shown by William L. Chase & Co., 95 and 97 Liberty street, New York. The principle of this governor is the employment of the reaction of oil in a closed chamber, upon a screw propeller, as a regulator for the motion of engines, etc.

Bulkley's Improved Pyrometer, described and illustrated on page 130, Vol. XXIV., of this journal, is shown by Henry W. Bulkley, 10 Barclay street, New York.

The boiler, the name of which we failed to obtain last week, is Lowe's Improved Tubular and Flue Boiler, exhibited by Todd & Rafferty, No. 10 Barclay street, New York. The furnace of this boiler is constructed so as to consume the gases far more perfectly, it is claimed, than has hitherto been done, thus securing greater economy in fuel. The boiler supplies steam to some of the machinery at the fair, and works, we were told, very satisfactorily.

MISCELLANEOUS OBJECTS OF INTEREST.

Attracting perhaps as much attention as any other machines on the floor of the Rink, stands one large—and one small Lyall's Positive Motion Loom. The large loom is running on carpet five yards wide, and the small one on narrow print goods. Both looms have been much improved since their first appearance at the fair two years ago, and they now run as smoothly as could be desired, doing excellent work, and eliciting many encomiums from those who inspect them. We are informed that these looms are effecting a revolution in the manufacture of wire cloth, being peculiarly adapted to the production of such fabrics. Five new mills have been started, with the purpose of employing these looms, since they were first introduced, which is a sufficient vindication of our opinion, in regard to the importance of the improvement, expressed in the descriptive article which first brought the invention prominently before the public; and for which some of our cotemporaries rather incautiously took us to task. This inclosure forms one of the most attractive features of the present fair.

Another very attractive and interesting display is the Fitz Henry

LEATHER SCOURING AND HIDE WORKING MACHINE,

shown by the Hide and Leather Machine Company, 64 High street, Boston, Mass., which scours and works leather in such an effective manner as, it is claimed, to enable one man to do the work of ten by the old system of hand working. The description of the construction, operation, and advantages of this machine might well fill the entire space allotted to our notices this week, and we will not, therefore, attempt it. Suffice it to say that the machine imitates the working of the hand tools exactly, producing the same effect, only doing its work more thoroughly and rapidly. No one visiting the fair should fail to see this machine in operation. It forms one of the features of the exhibition.

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Another most interesting machine is the Campbell's Combination

PRINTING PRESS

which is shown in operation, and to which it will be impossible to do full justice in our limited space. This press will not print unless the paper is fed in. The moment the sheet is not presented to the grippers, the inking rollers and all the other parts necessary to make the impression cease to move. The mechanism by which this beautifully automatic action is effected is a triumph of ingenuity. As the sheet is fed in, it passes over small apertures in the ends of a set of small air tubes, which are gently pressed down upon it, the paper thus acting as a valve, preventing the movement of a small plunger in a cylinder, which plunger, by suitable contrivances, controls all the other movements of the press. When we say that the "Aldine Press," the finest art journal published in America, is printed on one of these presses, we have said enough for its delicacy of execution. The press is shown by the Campbell Press Works, Thomas H. Senior, agent; office, *Sun* Building, New York. The same firm also exhibit a smaller press of different construction.

## EDITORIAL SUMMARY.

GUN COTTON is now manufactured in England to an amount exceeding 100 tons per annum. The cotton fiber is reduced to a pulp, as in paper making, in which condition the excess of acids is readily removed. The pulp is compressed into disks, under a pressure of 18 tons to the inch, and then dried. These disks are $\frac{7}{8}$ inch to 7 inches in diameter, and $\frac{1}{2}$ inch to 2 inches thick. In the open air this compressed cotton burns intensely but without explosion; but when properly exploded under close confinement, its strength is from two to five times that of the same weight of gunpowder. If accidentally wetted, this form of gun cotton can be redried by exposure to the sun, or even by a gentle heat, without risk of explosion or deterioration.

NEW TEST PAPER.—Professor Böttger announces the discovery of a new re-agent, which, he asserts, is highly sensitive to the alkalies. It is a coloring extract of the *coleus verschaffelti*, and is produced by digestion, for 24 hours, in pure alcohol, to which a few drops of sulphuric acid have been added. The hue is a brilliant red, which turns green on contact with any alkali. It is not affected by carbonic acid, and will detect the slightest trace of ammonia in illuminating gas, if moistened and placed against an open jet. The presence of the minutest quantity of a carbonate of any of the alkalies is detected by it.

THE GLACIERS OF AMERICA.—The Rocky Mountains are likely to afford the explorers of this continent the same opportunities of investigation of the phenomena of glacier formation, and of meteorological occurrences at great altitudes, that Switzerland has so long given to Europeans. On Mount Ranier, in Washington Territory, there is a glacier ten miles in length by five in width, and many others are known to exist. The erudite weekly London publication, the *Academy* suggests the Rocky Mountains to the Alpine Club, as a field new to its members, who are by this time well acquainted with all the accessible peaks of Switzerland.

THE POLARIS.—We have received news from the *Polaris* and are able to report that she left Disco Island, off the coast of Greenland on August 17th. There had been a disagreement, between Captian Hall and the scientific members of the expedition as to the objects of the voyage, but this had been amicably arranged by Captain Davenport, of the United States ship *Congress*. Captain Hall has decided to keep to the west side of Smith Sound, as the other route, by Jones Sound, originally intended to be pursued, is likely to be more difficult of passage, the pack ice being already considerable in quantity.

THE RHYSIMETER.—Our English advices inform us of the invention of a new instrument called by the above name, for measuring the force of flowing liquids. It exhibits the force of impact of the moving fluid, and is somewhat similar in construction to the anemometer. Another obvious purpose for which this indicator can be used, that of measuring the speed of ships, will probably be its most valuable application. A column of mercury forms the index, and the instrument may be mode self registering and recording.

OIL WORKS IN RUSSIA.—At Riazan, a large city 150 miles to the southeast of Moscow, Russia, extensive works for raising and refining petroleum are now in course of erection, for which the necessary machinery is being constructed in England. The coal mines at Kharloff and in the neighborhood of Taganrog are known to lead to deposits of enormous extent, and it is believed that the supply of oil from these mines will be practically inexhaustible.

### Examples for the Ladies.

W. Kelly, of Amsterdam, N. Y., earned with a Wheeler & Wilson Machine, in 14 years, $14,564, in making coats; an average of more than $20 a week, with but a few cents for trifling repairs.

### Foreign Patents.

The population of Great Britain is 31,000,000; of France, 37,000,000 Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address MUNN & Co., 37 Park Row, New York. Circulars with full information on foreign patents, furnished fre

## Business and Personal.

*The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per Line will be charged*


Repertory of Arts.—For sale, a complete set of the Repertory of Arts, handsomely bound, half calf, uniform size, with general indices comprising five series and 113 volumes. Perfect in every respect. Embracing Inventions, Discoveries, and Improvements in Arts, Manufactures and Agriculture, with Engravings—from 1795 down to 1856. Apply to MUNN & Co., office of the SCIENTIFIC AMERICAN.

To Manufacturers.—Wanted.—By a competent man (American) a situation to run wood working machinery. Sash and door factory preferred. Address Box 136, Morris, Grundy Co., Illinois.

Turkey Boxwood pieces for Sale, suitable for engravers and fancy turners' use. Address Stephens & Co., Riverton, Conn.

Wanted—Time & Wages Table. Chas. W. Sleeper, Lowell, Mass.

Consumers of Plumbago will do well to send their addresses to C. H. Clark, Loco. Mining Co., Laramie City, Wyoming Territory.

Manufacturers of Steam Pumps will please send Descriptive Circulars and Price Lists to Joseph Capps & Sons, Jacksonville, Ill.

A superior chance for a few young men to learn the trade of making Machinery. Special terms made with any who have some practical experience. Address Lock Box 129, Woonsocket, R. I.

Patent Wanted—One connected with Notion, Toy, or Hardware trades. Barnes & Cruttenden, 335 Broadway, New York.

Patent Felt Floor Carpeting. C. J. Fay, Camden, N. J.

Parties desiring to introduce and sell machinery of any kind, and of agricultural or other useful implements in Texas, will meet representatives of a firm at Galveston largely interested in that line, by addressing J., 49 Clinton Place, New York.

All kinds of Presses and Dies. Bliss & Williams, successors to Mays & Bliss, 118 to 122 Plymouth St. Brooklyn. Send for Catalogue.

The best lubricating oil in the world is Winter pressed Sperm. Sold in bottles, cans, and barrels, by Wm. F. Nye, New Bedford, Mass.

Gear Wheel Moulding Machines—Paget's Blocks and Gipsy Winches (English Patent). Hamilton E. Towle, 176 Broadway, New York.

Improved Mode of Graining Wood, pat. July 5, '70, by J. J. Callow, of Cleveland, O., enabling inexperienced grainers ("without the long required study and practice of heretofore") to produce the most beautiful and Natural Graining with unequalled speed and facility. Send stamp for circular.

The paper that meets the eye of manufacturers throughout the United States—Boston Bulletin, $4 00 a year. Advertisements 17c. a line.

Wanted—A man who thoroughly understands making malleable iron, and can superintend a foundry. Address M. I. F., Worcester, Mass.

Upright Drills—The best in the world are built by the Hawes Machine Co., Fall River, Mass. Send for circular.

Consolidation—"American Manufacturer and Trade of the West." Pittsburgh. Finest and best paper of its class in the world. Everybody takes it.

Presses, Dies, and all Can Tools—Ferracute Works, Bridgeton, N. J.

Refined Paraffine Wax, any kind and quantity. C. C. Beggs & Co., Pittsburgh, Pa.

The Eccentric Elliptic Geared Power Presses save power, time, labor, and save Punches and Dies. For Circulars, address Ivens & Brooke Trenton, N. J.

Vinegar—how made—of Cider, Wine, or Sorgo, in 10 hours F. Sage, Cromwell, Conn.

For best Lubricating Oil, Chard & Howe, 134 Maiden Lane, N.Y

To Cotton Pressers, Storage Men, and Freighters.—35-horse Engine and Boiler, with two Hydraulic Cotton Presses, each capable of pressing 35 bales an hour. Machinery first class. Price extremely low. Wm. D. Andrews & Bro., 414 Water st. New York.

L. & J. W. Feuchtwanger, Chemists, 55 Cedar st., New York, manufacturers of Silicates of Soda and Potash, and Soluble Glass.

Send your address to Howard & Co., No. 865 Broadway, New York, and by return mail you will receive their Descriptive Price List of Waltham Watches. All prices reduced since February 1st.

Self-testing Steam Gauge.—The accuracy of this gauge can be tested without removing it from its connection with the boiler. Send circular. E. H. Ashcroft, Boston, Mass.

Ashcroft's Low Water Detector. Thousands in use. Price, $15. Can be applied for less than $1. Send for Circular. E. H. Ashcroft, Boston, Mass.

Brown's Coalyard Quarry & Contractors' Apparatus for hoisting and conveying material by iron cable. W. D. Andrews & Bro, 414 Water st., N. Y.

Presses, Dies, and Tinners' Tools. Conor & Mays, late Mays & Bliss, 4 to 8 Water st., opposite Fulton Ferry, Brooklyn, N. Y.

Over 1,000 Tanners, Paper-makers, Contractors, &c., use the Pumps of Heald, Sisco & Co. See advertisement.

For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for lithograph, etc.

Mining, Wrecking, Pumping, Drainage, or Irrigating Machinery, for sale or rent. See advertisement, Andrew's Patent, inside page.

Superior Belting—The best Philadelphia Oak Tanned Leather Belting is manufactured by C. W. Arny, 301 Cherry Street, Philadelphia.

Improved Foot Lathes, Hand Planers, etc. Many a reader of this paper has one of them. Selling in all parts of the country, Canada, Europe, etc. Catalogue free. N. H. Baldwin, Laconia, N. H.

Bailey's Star Hydrant, best and cheapest in the world. All plumbers send for a circular to G. C. Bailey & Co., Pittsburgh, Pa.

Wanted—To invest $500 to $5,000 in a good paying Manufacturing or Mercantile Business. Address Box 574, Pittsburgh, Pa.

Patent for sale, or Partner wanted with capital to introduce the same. Please address Philip Marquard, 468 Swan st., Buffalo, N. Y.

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Diamonds and Carbon turned and shaped for Philosophical and Mechanical purposes, also Glazier's Diamonds, manufactured and reset by J. Dickinson, 64 Nassau st., New York.

Peck's Patent Drop Press. For circulars address the sole manufacturers, Milo, Peck & Co., New Haven, Ct.


## Answers to Correspondents.

*SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisements at 1·00 a line, under the head of "Business and Personal"*

*ALL reference to back numbers must be by volume and page.*

SUBSTITUTE FOR ALCOHOL FOR BLOW PIPE LAMPS.—A. K. wishes a substitute for alcohol. I have tried several, but have not found one efficient. In the use of alcohol, a large part of the burning surface is invisible while soldering, and thus a larger blaze is required to direct it. If a few drops of kerosene be added, the whole of the blaze is visible, thus enabling the operator to use less burning surface; for he can direct the whole amount to the purpose for which it is needed, and at the same time economizing the burning of the alcohol.—R. B. F., of N. Y.

DIMENSIONS OF A RIGHT ANGLED TRIANGLE.—I think C. E C. will find his dimensions for a right angled triangle nearer correct by the following method than by the others already given. Given the three angles and perpendicular—let A B C be a right angled triangle; C, the right angle, A, the angle between base and hypothenuse. Let $a$, $b$, $c$, be the sides respectively, opposite these angles; then sine $A = a \div c$, or $c = a \div$ sine A, which, by using logarithms, gives value of $c$ to be log. $c$ = log. $a$ — log. sine A. To find $b$: tan. $A = a \div b$, or $b = a \div$ tan. A, or log. $a$ = log. $b$ — log. tan. A. Squaring sides does not insure the accuracy this does, unless they are even squares and roots.—E. H. J., of Ga.

DIMENSIONS OF A PLANE RIGHT ANGLED TRIANGLE.—The base and angles being given, to find the perpendicular and hypothenuse. The solution by J. L., of N. Y., is good as far as it goes. The equation in the form given requires two operations for each of the sides containing the right angle. Then he refers to the square root to find the hypothenuse, which requires four more operations, thus requiring six shots to bring down the game that may as well be brought down with two, thus: For the perpendicular, multiply the base by the tangent adjacent angle; and for the hypothenuse, divide the base by the cosine adjacent angle. The solution by N. F. P., of ——, begins well, but as to the hypothenuse he is badly fogged; he gets parts of two rules mixed up, that do not pertain to the question; then, to show another method for this side, he gives a rule not known to the disciples of Davies. He says: "Multibly the square o the base by the square of the perpendicular," etc. The solution of F. E N. E., of Mass., is subject to the same objection as that of J. L. The plan of solving a triangle partly by trigonometry, and partly by some other method—as by the square root, or by mechanical construction—is like a farmer plowing half a field with a polished cast steel plow, then throwing it by for an old fashioned spud or wood plow. Moreover, no matter how much the principles underlying an operation may be elucidated, the rule should be terse and concise to the last extremity. But D. B., of N. Y., bears off the palm. He says "the squares of the two sides containing the right angle will be proportional to each other inversely as the two angles are." This is something new, a proposition not known to Euclid, or Descartes, or Legendre.—H. C. P., of Mich.

ROLLING BODIES—The problem of the three balls, too, in the same column, is as unfortunate as that of the triangle; both answers are incorrect. The second one would be well enough as far as it goes, if "not" were introduced between the words "will" and "roll;" and the person who would pick up that ball first down the plane, for the gold ball, would be badly cheated, as the gold ball would be the last one down the plane. The explanation would be too long in an answer of this kind but it is readily given. See "Gregory's Mathematics," Art. 6, page 241, or "Bartlett's Analytical Mechanics," example 6, page 243, with the final equations on page 246, same example, for a discussion of this question, though a good idea of it may be had without going into the calculus, as Mr. Bartlett has done.—H. C. P., of Mich.

DIMENSIONS OF RIGHT ANGLED TRIANGLE.—In your paper of Sep. 16th, N. F. P. gives the following rule for finding the hypothenuse "Multiply square of base by square of perpendicular, extract the square root of result." Thus, if the base be 3, and perpendicular 2, hypothenuse will be 6, or more than the sum of the other sides, which proves that a straight line is not always the shortest distance between two points.—W. L. S., of N. Y.

CONSTRUCTION OF BELLOWS.—In the issue of September 9th, T. E. L. gives directions how to equalize the flow of air from a pump or bellows, by boring an inch hole in a keg, and fastening it to the bottom of a tub two thirds full of water. If there were any great flow of air, surely this would not equalize the pressure, as the friction of water in such a small hole would prevent any tendency in that direction. Moreover, if there were no friction, the pressure of the water outside would vary inversely as the quantity of air in the keg. A common pair of blacksmith's bellows, with a weight on the top, would regulate the flow much better. By turning a tub upside down, and letting it float in water after the manner of a gasometer, a tolerably even pressure may be secured.—W. L. S., of N. Y.

FLOW OF WATER THROUGH PIPE.—In answer to J. R. B. (query 17, Sep. 16) I would say that we have found the same trouble with a lead pipe that he has with an iron one. The pipe is laid in uneven ground, and from one point there is descent both ways. Our theory is that the air which is always held in suspension in spring water, collects at this point, and can only be driven out by a rapid flow of water. If a torrent of water could be forced through the pipe, no doubt the air would be forced out at once, but with only a moderate increase of speed, it is natural to expect that the pipe should take some time to clear itself.—W. L. S., of N. Y.

HEATING SURFACE OF BOILER.—I will reply to A. H. G. (Sep 16, 1871), in regard to heating surface of boilers, by referring him to the "Practical Examiner on Steam and the Steam Engine," page 24, where it says: "The extent of heating surface ought not to be less than nine square feet, and one square foot of furnace bars, to each nominal horse power." The rule is a very good one.—J. K. W., of Mich.

TWIN BOILERS.—S. T. P., of Ind.—Will the objections urged against tubular boilers when the water supply is connected, as, for instance, the forcing he water from one to the other, on account of hotter fire under either, be applicable to two portable engines and boilers, each engine supplying its own boiler, and having a steam connection only from the dome of each, above the water? Answer: We think not.

COLORING GOLD.—Let R. L. K. take one ounce nitrate of soda, and one half ounce of chloride of sodium, and dissolve in a slight excess of warm water, afterwards adding to the solution about five drams hydrochloric acid. The solution should be kept boiling while the work is in it.—R. S., of Mass.

STEPS FOR WATER WHEELS.—If querist (No. 3, Sep. 16th) will use locust—the end turned spherical—and keep it under water while running, it will last for years; it is better than lignum vitæ.—M. W., of N. J.

HEATING FURNACE.—If N. S. H. (query 12, Sep. 16th) will take an iron pot or box, fill it with lead, and heat it to redness, he can heat his springs without danger of overheating; this is the way files are heated for hardening.—M. W., of N. J.

H. G. F., of Nevada.—You can have your ores analyzed which will determine the percentage of precious metal. Send your specimens to John C. Draper, Professor of Chemistry, in the University Medical College. His terms are reasonable, and you can rely upon his analyses being correct. His address is 429 Lexington Avenue, New York.

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**Asthma.**—"Whitcomb's Remedy very soon relieved me."—*Rev. A. L. Barber, Wallingford, Conn.*

## Queries.

*[We present herewith a series of inquiries embracing a variety of topics of greater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers.]*

1.—CHEWING GUM.—What are the ingredients and the quantity of each used in making rubber chewing gum; and what is the process of manufacture? Can any scientific reader tell me if the saliva, produced by chewing this gum, has any injurious effect on the system? Is it as injurious as tobacco? What effect has gum made from white resin, on the system?—C. B. S.

2.—MELTING RUBBER.—At what degree of heat will rubber soften, and how long will a piece of rubber, one inch square, stand pounding before wearing out? (I allude to such rubber as is used for wagon springs.) Can rubber be melted and poured, in a liquid form, into a mold? What is the process of preparing it for this purpose?—C. B. S.

3.—WIRE FOR ELECTROMAGNET.—Will some of your correspondents answer the following question: Is brass wire as effectual for winding electromagnets as copper?—C. E. S.

4.—RHUMKORFF COIL.—Can any of your correspondents tell me where I can obtain a Rhumkorff coil, and what will it cost?—C. E. S.

5.—HORSESHOE MAGNET.—If a horseshoe magnet is suspended so as to revolve freely, will its motion be retarded if the armature be brought near its poles?—C. E. S.

6.—ELECTROMAGNET.—How large an electromagnet is required to produce a spark?—C. E. S.

7.—SLAG FROM FURNACES.—I see by some remarks in the issue of September 2d that the slag from blast furnaces can be used for making blocks. Please inform me the process necessary for their manufacture.—E. H. J.

8.—ANNEALING CAST IRON.—Will some of your readers give me the process for annealing cast iron?—E. H. J.

9.—COAL BUCKET.—I handle 20,000 tuns of coal yearly by steam power. Is there any known substitute for the bucket, and is there any self dumping bucket now in use?—B. W. O.

10,—CHEAP LIGHT.—I work my vessels at night to save demurrage. What is the cheapest mode of obtaining a powerful light, and what does the calcium light cost per hour?—B. W. O.

11.—DOUBLE ACTING RAM.—In your paper of September 16th, page 186, under head of "Fountain," C. H., of N. H., speaks of a double acting ram. Will he be so kind as to say how it is constructed, or where the information can be got?—J. M.

12.—TEMPER OF STEEL TOOLS.—I notice in your columns dedicated to "Queries" and "Answers to Correspondents" that the general belief of experts is that the temper of tools cannot be drawn by immersion in hot water, or by a degree of heat less than the heat required for tempering. Will some of these persons explain why it is that the temper in steel knitting needles is lost after long usage, the said needles being exposed to no greater heat than may be induced by the friction of the needles while in use?—J. H. N.

13.—BUG DESTROYER.—I want to know what will destroy red spiders and green bugs or lice on plants.—G. W. B.

14.—COMBUSTION IN BOILER FURNACE.—Will G. A. T., in answer to A. H. G., on combustion in boiler furnace, be more explicit? Does he put the three eighth inch pipe around near the walls of the ash pit, and how far below the grate bars, and will it answer equally well for burning sawdust.—L. P. O.

15.—PARAFFIN CANDLES.—In making candles from refined paraffin, how can I keep the candles from becoming mottled or speckled?—J. K. S.

16.—GAS FOR TOY BALLOONS.—What gas is used for toy balloons, and how is it prepared? What amount of material would be required for inflating 100 of such balloons?—C. B. S.

17.—WELL.—I have a thirty foot well in a sandstone ledge in which the water a portion of the year gets very low. By digging deeper I think a better spring might be reached. But I wish to save the expense and trouble of taking down the walls and excavating deeper. Is it feasible to drive a tube twenty feet, commencing at bottom of present well? Will some one having had experience in drive wells answer through "Correspondence" column?—De S.

### Declined.

*Communications upon the following subjects have been received and examined by the Editor, but their publication is respectfully declined:*

BOILER EXPLOSIONS.—D. H. J.
CARPET PROBLEM.—A. D. B.
EXPLOSIVE WATER.—T. W. B.
FRICTION.—C. M.
LUSUS NATURÆ.—J. S. D.
PORTABLE BOAT.—O.
SEASONING LUMBER BY DRY STEAM.—R. G. B.
WATCH OPENER.—F. G. W.
ANSWERS TO CORRESPONDENTS.—F. H. O., JR.—H. B.

## Recent American and Foreign Patents.

*Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.*

BOXES FOR SHOE BLACKING, POMADE, ETC.—This invention consists in so forming boxes of plate metal by striking up, that they shall not possess seams or angles for the adherence of the contained material, and have no sharp edge at the mouth to cut the brush; it provides a foot on which the box may not only be conveniently poised, but which may be used as a handle to the box. It is the invention of Geifert H. Wetjen, of New York city.

BENDING MACHINE FOR CLIPS, SCABBARD JOINTS, RAILWAY CHAIRS, ETC.—A very powerful machine has been invented for the above named purpose, by Mr. John Forbes, of Halifax, Canada, which evidently is capable of doing a large amount of excellent work. The nature of the invention forbids anything like detailed description in such a n ice as the present. The scope of the machine extends to many kinds of work other than those enumerated, and the invention will repay examination by those interested n machines of this kind.

BED SPRINGS.—Hull Chandler, of Bennington, Vt.—Semi-elliptic springs are placed upon the frame of the bedstead to support the ends of the slats. The lower end of each spring has a hook, bent down into a recess provided for its reception in the supporting plate. To the upper face of the spring is secured a transverse block, of semicircular form. The slat rests on this block, and can freely rock thereon, thereby giving more play and greater flexibility to the bed bottom. From the block projects a pin through a slot of the slat, to guide the same, and prevent it from falling off.

GRAIN DRYER.—Alfred J. Mason, of New Orleans, La.—To effect his object the inventor makes use of a combination of cold air induction and exhaust pipes, with a drying cylinder beater. By this combination the grain may be either heated or cooled, as desired, and, it is claimed, the apparatus is very efficient for drying and cooling grain, for expanding and contracting rice, etc., etc.

GRAIN BINDER.—Mr. Oliver Ross, of Bowens Prairie, Iowa, has invented a grain binding apparatus for attachment to reapers. The operator, in using this device, draws the band across the bundle, and places the end of the band in grab fingers. He then presses a lever which operates the mechanism which completes the binding and cuts the band. The invention possesses features of originality upon which eight claims have been allowed in the patent.

PIPE WRENCH.—Henry Wilson, of Tarr Farm, Pa.—The lower jaw of this pipe wrench is rigidly affixed to a handle. The other handle is pivoted to the handle having the fixed jaw, and forked at its upper end. The movable jaw is pivoted to the upper part of the same handle. A pin projects from the sides of the movable jaw through slots in the forked upper part of the pivoted handle. Whenever the lower end of the other handle is carried toward the handle, its forked upper end will swing the movable jaw with great power toward the fixed jaw for holding a pipe or other thing.

MACHINE FOR SPLITTING WOOD.—David Milliken, of New York city.—This invention consists in a novel arrangement, with a feeding trough, of splitting axes mounted on swinging arms, which are raised by a revolving wheel and accelerated in their fall by springs, in such manner as to be similar in action to the action of an ax wielded by hand. The invention also comprises a novel arrangement of apparatus for actuating a pair of feed rolls by one of the ax carrying arms, in such a manner that the feed rollers will not be actuated if the ax fails of entering the wood far enough to split it.

SOFA BED.—Julius Werner, of New York city.—This invention relates to a new sofa bed of peculiar construction, which, when contracted, will hardly be distinguishable from an ordinary plain sofa or lounge, while, when folded apart, it will form a comfortable and large bed. Double jointed head and foot rests hinged to the ends of the sofa back, and a combination of a pivoted seat with a hinged back, frame, and rests in a peculiar manner, are the features of the invention upon which the claims are based, and for which a patent has been obtained.

CARPENTER'S BENCH.—Friedrich Starke, of Dayton, Ohio.—This invention has for its object so to apply the vise to a carpenter's bench that it can be set against the side or end of the table, as may be found most convenient. Carpenters' benches are at present either provided with a vise at the end or side only, or with two separate vises, the former plan being insufficient for the several kinds of work to be performed, while the latter is too expensive and cumbersome. The present invention consists in swiveling the post in which the nut of the vise is held to a corner of the bench, so that the entire vise can thereon be turned to work against the side or end of the bench, as may be convenient.

RECOIL OBVIATOR FOR ORDNANCE.—Samuel F. Hawley, of Constableville, N. Y.—This invention has for its object to prevent the recoil of cannon and heavy guns; and consists in the application to their muzzles of counter-recoil chambers, which receive the direct concussions of the charges, and thereby counteract the effect of the air rushing into the barrels to fill the vacuum subsequent to explosion. To the muzzle of a cannon is secured an extension which continues the bore of the gun and forms an annular chamber around the bore. This chamber is open at the back, but closed in front, and its inner wall is perforated. The front is claimed to receive the concussion of the charge which escapes from the vent in rear, while the vacuum created by the explosion is supplied, before the effects of the concussion on the front of the chamber is spent, through the same vent, thus counteracting the ordinary effect of, and causing the cannon to remain stationary after, an explosion.

BAG HOLDER.—Oscar Barrett and Azzel D. Brooks, of Dartford, Wis.—This invention relates to a new device for holding bags open to be filled with grain, vegetables, or fruit; and consists in the use of a semicircular hoop, folded under the rim of the bag, and of three or more forked posts for supporting said hoop. The central post is vertical; the others, equidistant from it, are inclined forward. The three posts are slightly forked at their upper ends, so that they can be used to support the semicircular hoop. This hoop is placed against the mouth of the bag, and the latter then placed over it, so that when the hoop is placed into the notches or forks of the posts, it will serve to hold the bag in position, as shown. By this device bags can be expeditiously secured in place, and will be properly held open to be filled.

WAGON SEAT.—James B. Foote, of Hamden, N. Y.—This invention consists in suspending a wagon box seat from springs placed at the top of two standards, on which the said seat slides and by which it is guided. The ordinary square box of a road wagon, with strong wood posts rising up from the sides, one from each, and supporting a C spring at the upper ends connected by one of its ends, while the other end overhangs the outside and has a rod of iron, a chain and rod depending from it. These rods, which extend downward about to the top of the box, pass through the seat ends, and hold the seat by nuts, pins, or india rubber springs and nuts. Inside of the holes through the seat ends or arms for the rods, mortises are provided for the post, which pass through them and guide the seat in moving up and down, and prevent it from swinging. According to one plan the rods will have a number of holes to admit of supporting the seat higher or lower; but when the short rods and chains are used, the hight of the seat may be varied by hooking the chain upon the spring, which may have hooks capable of engaging any of the links.

HAY AND STRAW CUTTER.—John A. Cornish, Marshfield, Mo.—This invention relates to a hay cutter with which is connected a mechanism for keeping the hay always in contact with the feed roller, whether there be more or less in the box, and in which the feed roller is spirally fluted, and turned always at the right moment, by means of a bar rotating in a plane parallel with the axis of the roller and striking the sides of the spiral corrugations one after another.

AUTOMATIC GOVERNOR VALVE.—Joseph B. Potter, Conneautville, Pa.—This invention has for its object, first, to automatically regulate the flow of steam from a boiler to the steam chest of an engine, in such manner as to reduce the volume of the flow directly as the pressure in the steam chest: and, second, to equilibrate the pressure upon the governor valve from the steam chest by means of a counter spring, which yields when the flow of steam from the steam chest is momentarily checked by the arrival of the slide valve at the center of its throw, and the consequent closing of both ports and returns when the slide valve passes to either end of its throw, so as to open one of the ports, and by this alternate yielding and returning, maintains a continual oscillation of the governor valve, thus preserving the constancy of the pressure in the steam chest.

CAR COUPLING.—Henry R. Robbins, Baltimore, Md.—This invention relates to a car coupling in which a tongue, pivoted in and projecting from one drawhead in order to connect two cars, enters a box placed within another drawhead, passes under and raises a pin that extends across said box, and passes through slots in the sides of the latter, said tongue being caught and held in the box by the falling of the aforesaid pin into a groove in the upper side of the tongue, the uncoupling being effected by raising said pin, through the instrumentality of a yoke connected with its ends, until it is clear of the groove in said tongue, when the latter may be withdrawn from the box.

FEED WATER HEATER FOR STEAM BOILERS.—John F. Taylor, Charleston, S. C.—This invention consists of a hollow chamber, called a "heater," provided with a number of tubes running transversely of it, and fitted crosswise of the interior of the smoke box, in front of and at a short distance from the tube sheet of the boiler, so as to be in the path of the unconsumed products of combustion in passing from the boiler to the smoke stack, whereby the heat thereof is utilized in heating feed water, the chamber receiving water from a feed pump at its bottom and discharging it at its top with the boiler.

MOLE TRAP.—G. W. Hardwick, Wyandotte, Ind.—This invention consists in a spring fork set over the tunnel in which a mole travels, and provided with a trigger against which the mole is compelled to press as he passes along.

DOOR FASTENER.—Warren A. Howard, of Dugway, N. Y.—This invention relates to portable door fasteners, which may be carried in the pocket and applied on the inside of a chamber. It consists in a bar with a claw, having a hole between the prongs thereof, combined with a shoulder, perforated in line therewith, and also perforated at right angles to the bar to hold the bolt of a portable door fastening.

SOFA BED.—Abraham Morris, of New York city.—This is a sofa bed which may be easily folded together to form a sofa, the invention consisting principally in pivoting the sofa seat and connecting it by rods to the extension bed frame, so that when the seat is turned outward it will at the same time extend the frame to support the outer half of the bed.

PICKET POINTER.—John W. Minor, of Middleborough, Mass.—The picket to be pointed is placed edgewise upon a beam with its end against a head block. A pivoted lever, carrying a cutter, is then made to face this cutter through the wood, the cutting being an arc of a circle. The pivot is adjustable, so as to give blunt or sharp points, and to accord with the width of the picket.

SAFETY ATTACHMENT FOR WATCH CHAIN OR GUARD.—Charles W. Mehrer, of New York city.—This is a device for attachment to a watch, to be carried in the pocket with it for preventing it, by means of hooks, from being picked out, said hooks being concealed in a case, and being thrust out into the clothing if the chain or guard which is attached to the protector be suddenly jerked.

TREADLE MOTION.—George K. Proctor, of Salem, Mass.—A double crank, the wrists of which are placed at right angles, is attached to the fly wheel of a sewing machine or other machine to be driven by the feet. The mode of attachment by means of a recrossed crank, screw threaded hole, and a plate, by which the improvement may be readily attached to the fly wheel of different sizes and forms of machines, constitutes the features of the invention.

BEE HIVE.—This hive is the invention of Edward D. Pugh, of Fort Plain, Iowa. It provides for frequent and convenient opening and closing to clean it of moth eggs and insects, without disturbing the bees; also for improved ventilation, for the better support of the combs, for the accomodation of young broods, and other essentials of a first class hive, the whole evidently being the design of a man thoroughly conversant with the habits of bees and the requirements of bee keepers.

WALL PAPER TRIMMING MACHINE.—Mr. Hubert L. Todd, of Corning, N. Y., has invented a machine for trimming wall paper, the use of which will obviate the tedious process of shearing off the blank edges by hand as heretofore done. The cutting is done by circular knives attached to rollers, between which the paper is caused to pass by winding it from one roller to another, the power being supplied through the medium of a crank attached to the journal of one of the knife bearing rollers.

POT COVER.—William Henry Barker, of Windsor, Can.—A stamped sheet metal pot cover of the ordinary kind, has a number of small holes made through it in one part near the edge, to admit of pouring off the contents of the pot without lifting the cover. A small lid is hinged to the upper side of the pot cover, to fall down over the holes and close them, so as not to allow the steam to escape while it is required that the pot be covered. Projections enter the pot to hold the cover from falling off when the pot is tilted to pour off the liquid contents.

WINDOW SCREEN.—Oscar F. Frost, of Monmouth, Me.—This is an improved construction of window screens, to facilitate their insertion in and removal from the window. It consists in attaching the mosquito bar to the frame or sides by a groove and tongue, and in attaching the frame to the window casing by means of key hole slots and screws. The advantages are, that this screen is readily adjusted to the window and removed therefrom, and, when not in use, may be rolled up and laid away, taking up but little space and not liable to be damaged like the common screen.

BURGLAR ALARM.—Mary A. Holland, of Passaic, N. J.—This invention relates to improvements in the bell sounding and signaling apparatus employed with apparatus to be set in motion by the opening of windows or doors to sound an alarm, or with the bell pulls of hotels for signaling from the different rooms. It consists in an arrangement of apparatus whereby the bell may be sounded from any window without affecting the apparatus connected with the other windows or doors, or interfering with the efficient operation thereof.

CORN HARVESTER.—This machine, by a variety of ingenious devices, pulls the ears from the standing stalks, husks them and deposits them in a suitable receptacle attached to the machine, which is drawn by horses. The ears are pulled from the stalks by fingers placed at such a distance from each other that the stalks will pass between them, but the ears cannot. Should any of the stalks be drawn from the ground, they are seized by conical rollers, and pulled down through the fingers to tear off the ears, the latter being husked by passing between endless belts, carrying a system of claws or teeth, which strip off the husks. The machine is the invention of Madison Thorp, of Waterloo, Iowa.

SEWING MACHINE.—Frederick E. Decker, of Newark, N. J., assignor to Edward Simon & Brothers, of New York city.—This invention is a new and improved attachment to a sewing machine for turning the rough edges from the leather covering of round or oval satchel handle stock, at the same time they are stitched on by the machine, or as they pass from the needle when being sewed. It consists in a pair of grooved guiding wheels and a pair of rotary cutters, having operating gear arranged to be actuated by a pawl lever connected with the feed bar, to be moved by it for feeding the handle along at the same time that the feed plate of the machine is worked. Such adaptations of the rollers are made as may be requisite for trimming the rough edges from any work done on a sewing machine.

COTTON CHOPPER, SCRAPER, AND CULTIVATOR.—Frank A. Leonhard, of Columbia, Tenn.—This invention has for its object to furnish a simple, convenient, and effective machine for chopping, scraping, and cultivating cotton, so constructed that the supporting and cultivating rollers, while supporting the chopper at the proper elevation, shall be capable of adjusting themselves to any unevenness of the ground laterally. The claims cover an arrangement of rollers and scraper in connection with arms, whereby they are adapted to oscillate, as shown and described; also an arrangement of two sets of rollers and scrapers, and a vibrating chopper, in connection with a pivoted frame.

GRATE BAR.—Joseph A. Miller, of Providence, R. I.—The object of this invention is to so construct grate bars as to combine strength with lightness of metal, and large area of air space with narrow openings, and allow freedom to expand and contract with varying temperatures. A broad central bearing bar is connected with end pieces, to the sides of which are attached one or more sections, consisting of three (more or less) independent brackets, which brackets increase in size and width from the inner to the outer one. The top portion of each bracket is round, with a rib extending down, and diminishing in thickness, so that a great area of air space is allowed beneath the fuel, while the ashes and incombustible matter mingled with the fuel freely escape to the ashpit. Instead of casting the sections to the central bar, the sections or the brackets may be cast separately and hooked or attached in any manner to the central bar.

RAILWAY CAR TRUCK.—John R. Mestier, of Galveston, Texas.—The car axle carries the wheels in the ordinary manner. The journal box is made of halves, of which each contains a semi-cylindrical cavity for holding the end of the axle. Bolts serve to lock the halves of the box together. Within the halves of the box are placed, in suitable grooves provided for their reception, two semi-annular plates made of case hardened steel. They embrace a collar, which is placed upon and securely fastened to the axle, and also made of case hardened steel. The plates constitute a swimming journal for the axle, which, by its collar, has its entire bearing thereon. The collar has flanges at the ends to embrace the journal for the purpose of preventing longitudinal displacement. Each plate is held in place by a screw. The upper screw fitted through the upper half of the box, is tubular, and carries an oil reservoir at the upper end for lubricating purposes. The lower screw is fitted through the lower half of the box. A rubber washer is placed upon the axle and crowded, by a spiral spring, against the back of the journal box to entirely close the aperture in the same. The rubber prevents dust and impurities from entering the box, and does away with the packing heretofore used, and also with the expensive brass disks.

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BURGLAR ALARM FOR WINDOW.—Mary A Holland, of Passaic, N. J.—This s an improvement in alarm attachments to windows for ringing bells when hey are raised; and it consists in an arrangement of apparatus for imparting a vibrating movement to a vertical bell supporting rack or frame, by means of a cam or notched plate on the window sash and a spring. Both the upper and lower sashes are to be caused to sound the alarm, and they are both provided with a set of apparatus for working it, and both sets of apparatus are connected to a bell crank at the top of the window frame. The cranks of the two sashes are so arranged that the cords or wires connecting them with the bell crank extend along the bottom of a groove formed in the window frame between the sash, so that no labor is needed to provide space for them, or at least not more than for slightly deepening the groove. This admits of readily applying the apparatus to windows already built.

LATHE FOR TURNING IRREGULAR FORMS.—Henry R. Hill, Nelson W. Twiss, of New Haven, Conn.—This invention relates to mechanism arranged, in combination with a slide lathe, for cutting or turning prismatic and other forms, intended more especially for turning or cutting stone columns, stone fence posts, balusters, etc., but applicable to wood, metal, and other material; and consists in the construction and arrangement of certain parts, consisting mainly, of a lathe carriage, cutter, cutter slide, spring, eccentric, and feathered shaft, whereby, by a change in the form of the cam, a variety of irregular forms are produced. The article to be turned constantly revolves with an uniform motion, and the position of the cutter, at every moment of time, is governed by the cam. At first sight it appears difficult to cut a perfectly flat surface on a revolving body, as a prism or a polygon, or to flute a column or other article; but as the revolving cam, which governs the cutter, may be of any form, the operation is made quite easy. For turning a taper, the tail center is moved laterally, as in ordinary lathes.

BRIDLE BIT.—Smith C. Boughton, of Waterford, N. Y.—This invention has for its object to furnish an improved driving bit, which shall be so constructed that it may be differently adjusted to meet the different faults of the animals to be driven, bringing the animal in every case completely under the control of the driver. By pulling upon the driving reins, the cheek pieces are forced against the horses' mouths, and the nose band acting as a fulcrum, the bits are thrown to the roof of the animal's mouth with great force, which, together with the side pressure of the cheek pieces, causes him to yield at once. When the nose strap is not used, the bits press upon the animal's lower lips, which, with the side pressure of the cheek pieces, forces the animal's mouth open, loosening his hold upon the bits. In another arrangement, pulling upon the driving reins forces the cheek pieces against the sides of the animal's mouth, and the bits against the roof of his mouth, but not with the same force as when the first arrangement is used. Still another will not compress the sides of the mouth, and may be used for ordinary driving. For a tender mouthed animal, the arrangement may be so adjusted as not to allow the bits to press with much force against the animal's lower lip when the reins are pulled upon, thus applying the pressure to the nose and relieving the tender mouth. Various other arrangements of the bits may be made, to meet special faults of the animal to be driven.

## Inventions Patented in England by Americans.

September 5 to September 11, 1871, inclusive.

[Compiled from the Commissioners of Patents' Journal.

CHILLED ROLLS.—G. G. Lobdell, Wilmington, Del.
FURNACE.—C. F. Pike, Providence, R. I.
FURNACE.—P. W. Mackenzie, Blauveltville, N. Y.
NAVIGABLE VESSEL.—B. T. Babbitt, New York city.
ORDNANCE.—H. Arden, Brooklyn, N. Y.
PICKLE FORK.—H. Laurence, New Orleans, La.
PREVENTING OXIDATION.—C. Godfrey, Dix Hills, N. Y.
PRINTING MACHINERY.—G. P. Gordon, Rahway, N. J.
PRINTING PRESS.—V. E. Mauger, New York city.
PRINTING PRESS.—V. E. Mauger, New York city.
STOPPER.—W. C. Street, New York city.

## Official List of Patents.

### ISSUED BY THE U. S. PATENT OFFICE.

FOR THE WEEK ENDING SEPTEMBER 26, 1871.

*Reported Officially for the Scientific American.*

SCHEDULE OF PATENT FEES:

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119,218.—FIRE ARM.—A. Burgess, New York city.
119,219.—LOCOMOTIVE ENGINE.—W. A. Carns, Malden, Mass.
119,220.—WATER WHEEL.—J. T. Case, Bristol, Conn.
119,221.—HORSE POWER.—R. J. Cheney, Petaluma, Cal.
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119,223.—SHAWL STRAP.—G. Crouch, Westport, Conn.
119,224.—PAPER PULP.—A. K. Eaton, Brooklyn, N.Y.
119,225.—GENERATOR.—J. Eberhardt, Conshohocken, Pa.
119,226.—LADDER HOOK.—S. D. Fish, Schuyler Falls, N.Y.
119,227.—GAS.—T. B. Fogarty, Brooklyn, N.Y.
119,228.—FEEDING MACHINE.—J. C. Gould, Oxford, N. J.
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119,233.—TRUSS.—N. Jones, Syracuse, N.Y.
119,234.—CRIMPER.—M.R. Lemman, W.A.L.Kirk, Hamilton, O.
119,235.—SPINDLE.—T. E. McDonald, Trenton, N. J.
119,236.—FENDER.—W. H. Miller, Philadelphia, Pa.
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119,271.—FASTENER.—A. Haye, Morrisania, N.Y.
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119,273.—PICTURE NAIL.—H. L. Judd, Brooklyn, N. Y.
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119,300.—WASH BOILER.—S. Bennett, Newcastle, Pa.
119,301.—MEDICAL COMPOUND. T. W. Bethel, Brooklyn, N.Y.
119,302.—COUPLING.—C. Bridgman, St. Cloud, Minn.
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119,305.—ELEVATOR.—G. W. Brown, New York city.
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119,367.—COTTON PRESS.—J. B. Knight, New Orleans, La.
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119,436.—STILL.—E. Werner, Canton, Ill.
119,437.—MOTION.—H. F. Wheeler, Boston, Mass.
119,438.—GATE.—F. Whitaker, Bel Air, Md.
119,439.—BRUSH.—G. Willett, St. Albans, Vt.
119,440.—BRUSH.—G. Willett, St. Albans, Vt.
119,441.—OIL CAN.—G. D. Winchell, Cincinnati, Ohio.

### REISSUES.

4,567.—WHEEL.—J. R. Baird, Vincennes, Ind.—Patent No 117,142, dated July 18, 1871.
4,568.—STOVE.—M. A. Boughton, Norwalk, Conn.—Patent No. 113,842, dated April 18, 1871.
4,569.—AUGER.—J.Swan, Seymour, Conn.—Patent No. 116,509, dated June 27, 1871.
4,570.—WRINGER.—W. Whitney, Winchendon, Mass.—Patent No. 33,861, dated December 3, 1861.
4,571.—GLASS MOLD.—W. C. King, Pittsburgh, Pa.—Patent No. 114,569, dated May 9, 1871.
4,572.—LAMP.—C. B. and S. Mann, Baltimore, Md.—Patent No. 114,954, dated May 16, 1871.

### DESIGNS.

5,276.—CAN.—J. J. Bockee, Jr., New York city.
5,277.—CIGAR BOX.—A. Lis, Covington, Ky.
5,278 & 5,279.—CARPET PATTERN.—W.McCallum, Halifax, Eng.
5,280 & 5,281.—CARPET PATTERN.—D. Paton, New York city
5,282.—FRAME FOR SEAT.—H. M. Sherwood, Chicago, Ill.
5,283.—KNITTED FABRIC.—J. Taylor, Phila., Pa.
5,284.—ICE PITCHER.—G. Wilkinson, Providence, R. I.
5,285 & 5,286.—STAND.—A. Wunder, New Haven, Conn.
5,287.—BRACKET.—A. Wunder, New Haven, Conn.
5,288.—FASTENER.—P. Bradford, New Haven, Conn.
5,289 & 5,290.—ORGAN CASE.—L.K.Fuller, Brattleborough, Vt
5,291.—TROLLING SPOON.—J. H. Mann, Syracuse, N. Y.
5,292.—FRUIT BOX.—J. Sherman, Burlington, N. J.
5,293.—PIANO FRAME.—J. Whitney, Boston, Mass.
5,294.—LIFTER.—E. B. Wilbur, Raynham, Mass.
5,295.—DOOR BOLT.—A. Wunder, New Haven, Conn.

### TRADE-MARKS.

446.—LINIMENT.—W. H. Adams, F. A. Young, Bangor, Me.
447.—MEDICINE.—Atchison & Bro., Frankfort, Ind.
448.—MEDICINE.—Dunn & Co., London, England.
449.—LEATHER.—Eagle Works, Chicago, Ill.
450.—PLASTER.—C. W. Massonneau, Red Hook, N. Y.
451.—CORN SALVE.—J. McKee, New Orleans, La.
452.—MEDICINE.—J. Scott, New York city.
453.—MEDICINE.—Thompson, Steele & Price Manufacturing Company, Chicago, Ill.

### EXTENSIONS.

ELASTIC GORE CLOTH.—C. Winslow, Lynn, Mass.—Letters Patent No. 17,950, dated August 4, 1857: reissue No. 492, dated September 15, 1857.

CUPOLA AND OTHER FURNACES.—P. W. MacKenzie, Jersey City, N. J.—Letters Patent No. 18,051, dated August 25, 1857; reissue No. 1,403, dated February 10, 1863; reissue No. 1,843, dated December 27, 1864.

APPARATUS FOR SUSPENDING EAVES TROUGH.—J. A. Watrous, Green Spring, Ohio.—Letters Patent No. 18,113, dated September 1, 1857.

MOWING MACHINE.—G. C. Dolph, West Andover, Ohio.—Letters Patent No. 18,141, dated September 8, 1857; reissue No. 904 dated February 21, 1860.

EXTENSION GAS TUBE.—C. Monson, New Haven, Conn.—Letters Patent No. 18,154, dated September 8, 1857.

CULTIVATOR.—C. H. Sayre, Utica, N. Y.—Letters Patent No. 18,073, dated August 25, 1857.

SEPARATING ORE.—T. J. Chubb, New York city.—Letters Patent No. 18,038, dated August 25, 1857.

TYPE SETTING AND DISTRIBUTING MACHINE.—H. W. Alden, New York city.—Letters Patent No. 18,175, dated September 15 1857; reissue No. 3,572, dated July 27, 1869.

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# L. L. DAVIS'
# Adjustable Spirit Level, Plumb and Inclinometer.

| WOOD. PER DOZEN. | |
|---|---|
| No. 3. | $60 00 |
| No. 4. | 66 00 |
| No. 5. | 72 00 |

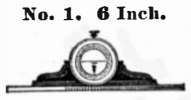
PATENTED IN UNITED STATES, SEPT. 17, 1867, MARCH 17, 1868, AND SEPTEMBER 22, 1868.

PATENTED IN ENGLAND, MAY 30, 1868.

ALL GOODS CASH ON DELIVERY.

WARRANTED FULLY EACH LEVEL

No. 1. 6 Inch.

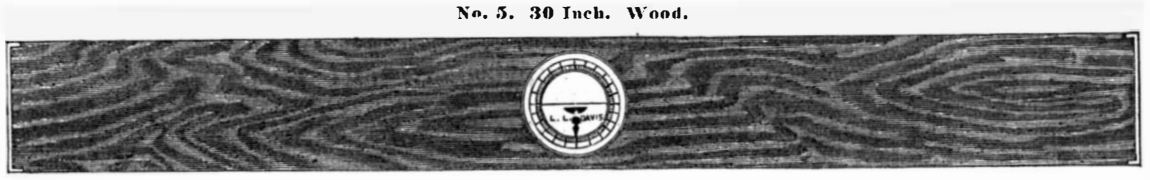


No. 2. 12 Inch.

No. 3. 18 Inch.

No. 4. 24 Inch.

No. 5. 30 Inch. Wood.



| IRON. PER DOZEN. | |
|---|---|
| No. 1. | $30 00 |
| No. 2. | 48 00 |
| No. 3. | 60 00 |
| No. 4. | 66 00 |

Nos. 1, 2, 3 and 4 of the Levels above represented, are constructed with Iron Stocks, and No. 5 has a Wood Stock, handsomely and strongly mounted, and with an adjustable center of same style as the Iron Stocks. These Levels are of the best material and workmanship in all parts, and are thoroughly adjusted and tested in every case. They have been universally pronounced to be the most accurate, convenient, and tasteful Level ever brought out, and will supply a want long felt by all classes of mechanics. The price places them within the reach of every one having use for either a Level, Plumb, or Inclinometer.

## SECTIONAL ELEVATION OF ADJUSTABLE SPIRIT LEVEL, PLUMB, AND INCLINOMETER.

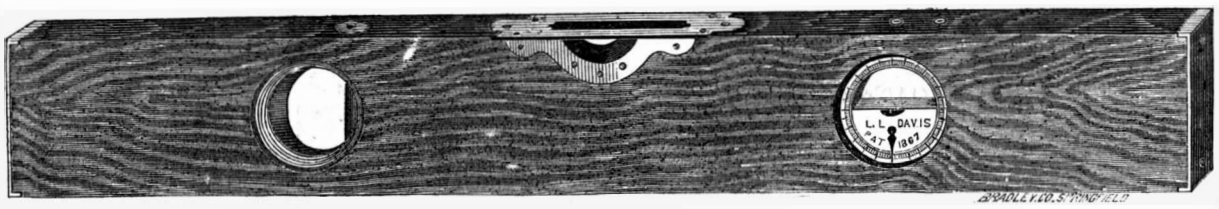
No. 5.

No. 5.

This Level takes the place of the old-fashioned Spirit Level and Plumb, which has been universally used by all classes of mechanics for many years. The advantage of this Level and Plumb over all others is the accuracy and simplicity by which it works; having a graduated scale showing the different angles, being conveniently and neatly arranged for getting elevations of any hight, the graduated scale showing the exact elevation or number of degrees per foot, simply by turning the center or bubble-case with a pointer attached, the bubble-glass being well and substantially protected, not liable to breaking or derangement, as is often the case with other Levels, and in case the bubble-glass should become out of true or out of line with the base of the Level, it can be regularly and accurately adjusted again to its proper place, simply by turning the top screws, which will cause the bubble to move forward or backward at any point desired. These screws in connection with studs, as shown in the above cut, act as stops and adjusting screws; the left hand screw, when facing the pointer, serves for adjusting the Level—the right hand screw, for adjusting the Plumb. These Levels are offered to the trade with the assurance that they are what is claimed, as a desirable instrument and a valuable tool, perfected to meet the wants of all classes of mechanics.

## ORDINARY LEVEL PLUMB AND INCLINOMETER COMBINED.

No. 13.




No. 13.

The construction of this Level is the same as the improved ordinary Level and Plumb, with the addition of the Inclinometer, which adds very much to its value or convenience for general use. It contains the old-fashioned Level and Plumb with his patent Adjustments and the Inclinometer combined.

This Level will be most highly appreciated by all mechanics having occasion to use it for getting angles or elevations of any required hight. It being so simply constructed, its operations will need no explanations, as it will be readily seen by any ordinary mechanic.

The Inclinometer may also, if desired, be used as a Level and Plumb.

## SECTIONAL ELEVATION OF ORDINARY ADJUSTABLE SPIRIT LEVEL AND PLUMB.

No. 10.

No. 10.

The adjustments of this Level and Plumb are perfectly reliable in all its parts; the Level adjustments having three positive bearings: a screw at each end of the bubble case, and a steel pin through the center, as represented in the above cut. In case the bubble-glass should become out of true with the base of the Level, from any accident, it can be readily adjusted again to its proper place, by turning the two center screws, one at each end of the top plate. Turning one screw back and the other forward, will cause the bubble to move at any point desired. This adjustment has no springs or any elastic substance whatever, and, when once adjusted, there is no liability of its getting out of order. The Plumb glass is adjusted by an eccentric step. Turning the eccentric step either way will adjust the Plumb.

## MASONS' LEVEL WITH DOUBLE PLUMB.

No. 35.

No. 35.

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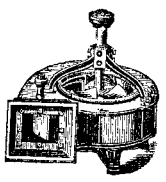

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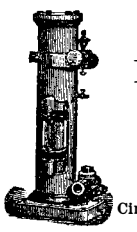

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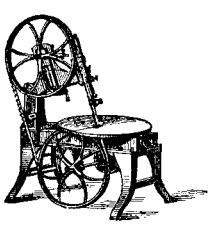

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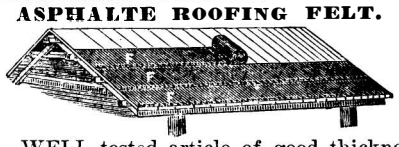

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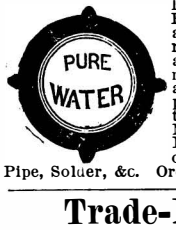


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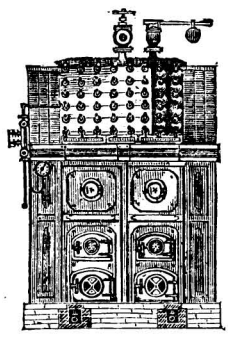

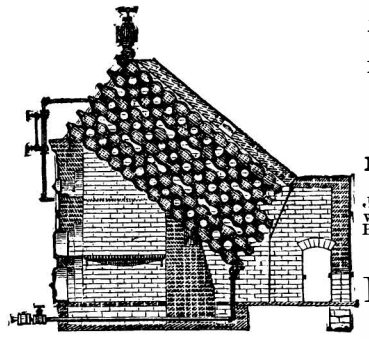

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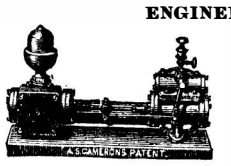

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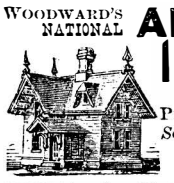

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